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DISCUSSION ON ACOUSTIC NEUROMA.*†

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THE OTONEUROLOGICAL DIAGNOSIS OF TUMOURS OF THE VIIITH NERVE.

In the course of the last 12 years it has been possible, through the good offices of our colleagues at Queen Square, to examine a large number of subjects suffering from tumours of, or affecting, the VIIIth nerve.

Although their total number has amounted to some 300, observations have been confined to a series of 95, in most of which a full range of otoneurological tests was carried out, including tests for loudness recruitment, and in which the presence of a tumour was later confirmed, either at operation or post mortem.

It is not the purpose of this communication to present any comprehensive catalogue of these findings. Instead, we have confined ourselves to a few familiar and practical themes concerned in the main with certain tests of cochlear and vestibular function, which lie very clearly within the province of the otologist and provide results of high diagnostic importance.

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Our cases have been divided into the following two groups:

Group I.—Acoustic neurofibromata. The number of subjects in this group was 70.

Group II.—Other tumours arising within or invading the cerebello-pontine angle, and so involving the VIIIth nerve. The number of subjects in this group was 25.

COCHLEAR FUNCTION.

Hearing Loss.—Our first theme is the amount of the hearing loss in subjects with VIIIth nerve tumours. A review of the literature, especially some of the earlier papers, leaves

TABLE I.

Hearing in 95 Subjects with Verified Angle Tumours.

	Group I Acoustic Neurofibromata	Group II Other Angle Tumours
Complaint of deafness	64 of 70 subjects (91%)	18 of 25 subjects (72%)
Average pure tone loss for speech frequencies	53 db for 70 subjects	42 db for 25 subjects

the impression that the hearing loss is nearly always severe or complete, and indeed the belief still seems to be held in some quarters that, unless this is the case, the diagnosis of a tumour is doubtful (Cushing, 1917).

More recent publications have made it necessary to modify this view and Ireland (1949), in his series of 92 cases, reported normal audiometric findings in 5 per cent. Edwards and Paterson (1951) also reported normal hearing in 2 per cent of their 157 cases.

We have considered separately the findings in our two groups of subjects. Of the 70 subjects in Group I, with acoustic neurofibromata, there was a complaint of deafness in 91 per cent. For the 25 subjects of Group II, however, this figure was only 72 per cent. This difference was in agreement with the audiometric findings. Here, we have expressed the hearing loss as an average in decibels (db) for the main speech frequencies, 500, 1,000 and 2,000 c/s. For Group I the average hearing loss was 53 db. For Group II,

however, the hearing loss was only 42 db. These figures are summarized in Table I.

Normal hearing does sometimes occur. In all of our 165 cases of verified acoustic neurofibromata, normal audiograms were found in two only. In the much smaller number of verified cases of other types of angle tumour, 63 in all, four showed normal hearing. It would seem, thus, that the degree

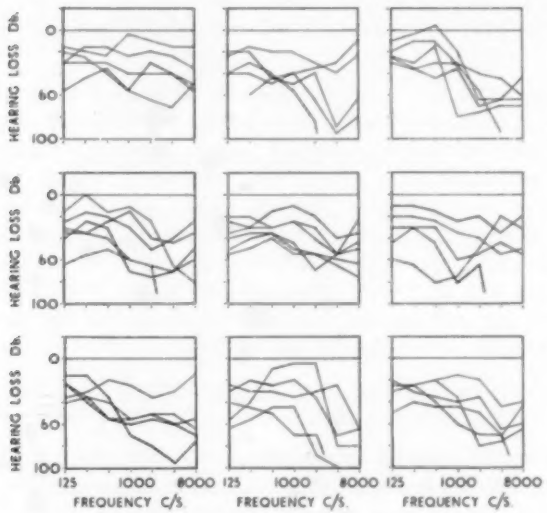

Fig. 1. Angle tumours. Group 1.

of deafness in tumours affecting the VIIIth nerve is of some value in establishing the character of the tumour, the finding of slight or moderate deafness favouring the diagnosis of some variety of angle tumour other than an acoustic neurofibroma.

The 95 subjects included in Groups I and II amount to approximately one-third of our 300 cases. Their average hearing loss amounted to 48 decibels and in all 95 a measurable degree of hearing was preserved. It may be concluded

that in at least one-third of our 300 cases some residual hearing remained.

Loudness Recruitment.—This subject again cannot be considered apart from the hearing loss.

In Figs. 1 and 2 are shown the audiograms of cases in which loudness recruitment tests were carried out. In Fig. 1 are shown 47 cases of Group I. In Fig. 2 are shown 22 cases of Group II. It can be seen that in all of these cases

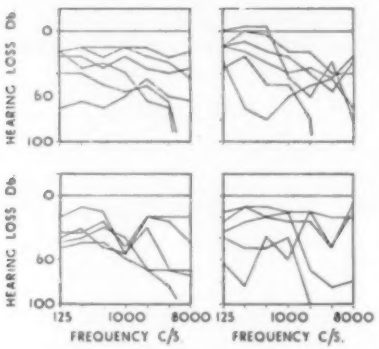

Fig. 2. Angle tumours. Group II.

quite useful hearing was present. In fact, in a significant proportion the hearing loss was surprisingly small.

The amount of this hearing is of some practical importance in relation to the practicability of tests for loudness recruitment; thus it is well known that Fowler (1949) attributed our findings of absence of loudness recruitment in VIIIth nerve tumours to severe deafness of the affected ear, resulting in a crossed response from the unaffected ear. The point is one which, of course, deserves careful consideration. It is generally agreed that the interaural attenuation for air-conducted sounds is of the order of 60 db. In our experience it nearly always exceeds this value. It follows that if recruitment tests were attempted in a case of unilateral deafness of the non-recruiting type, in which the hearing loss exceeded

60 db, then the result would certainly be, as Fowler states, a shadow curve, showing no recruitment, and comparable to the well-known shadow audiogram. In our subjects, however, the possibility of such an artifact does not exist.

In each of the 69 audiograms in Figs. 1 and 2 there was at least one frequency point at which the sensitivity difference between the two ears was less than 60 db.

In the vast majority of cases there were several such points, and at these points only, the recruitment tests were carried out.

It follows that in none of these 69 cases could the results have been confused by a crossover effect. Needless to say, in unilateral deafness of the recruiting type, as found in Ménière's disease, loudness recruitment tests will still give valid readings at the higher intensities, and so can be used when the hearing loss exceeds 60 db. In fact, it may be said that loudness recruitment, when it does occur, is never an artifact. Hence, a positive recruitment test in any case of unilateral perceptive deafness, whatever its degree, makes very unlikely the diagnosis of an VIIIth nerve tumour.

The loudness recruitment tests are usually carried out at the following frequencies: 500, 1,000, 2,000 and 4,000 c/s.

In Fig. 3 are shown our results for the 47 cases of Group I. All of the curves start at a point to the left of the 60 db mark; that is, in none did the hearing loss of the affected ear exceed 60 db. In most, the curves lie parallel to the normal equal loudness line, that is to say, loudness recruitment is completely absent. In a proportion, the curves show an inclination upwards indicating partial loudness recruitment, but in a few only does it reach the normal equal loudness line, giving full recruitment. In quite a number of others the curve slopes downwards constituting the phenomenon of recruitment reversal, a phenomenon confined, so far as is known, to severe organic disorders of the cochlear nerve fibres.

In Fig. 4 are shown similar curves for the 22 cases in Group II. Again, nearly all the curves lie parallel to the

normal equal loudness line, indicating the absence of loudness recruitment.

The number of cases in which full loudness recruitment was present at one or more frequencies was found to amount to some 10 per cent. This requires explanation, and it may be

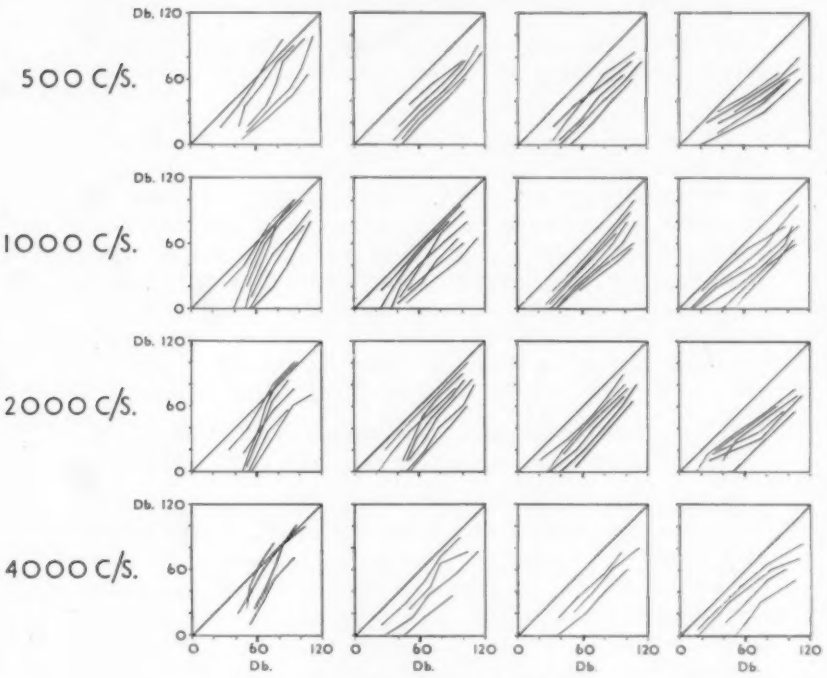

Fig. 1. Angle tumours. Group I.

recalled that we have explained it as being due to changes in the cochlear end-organ resulting from interference by tumour pressure with the cochlear blood supply (Dix and Hood, 1953). This argument was fortified by the finding in two such cases of the disappearance of loudness recruitment after the removal of the tumour.

Before leaving the subject of loudness recruitment, it would seem appropriate to consider the experiences of others. From a wide review of publications dealing with the diagnostic value of the tests it seems safe to say that since the demonstration (Dix et al., 1948) that loudness recruitment was pathognomonic of end-organ disease, and was characteristical-

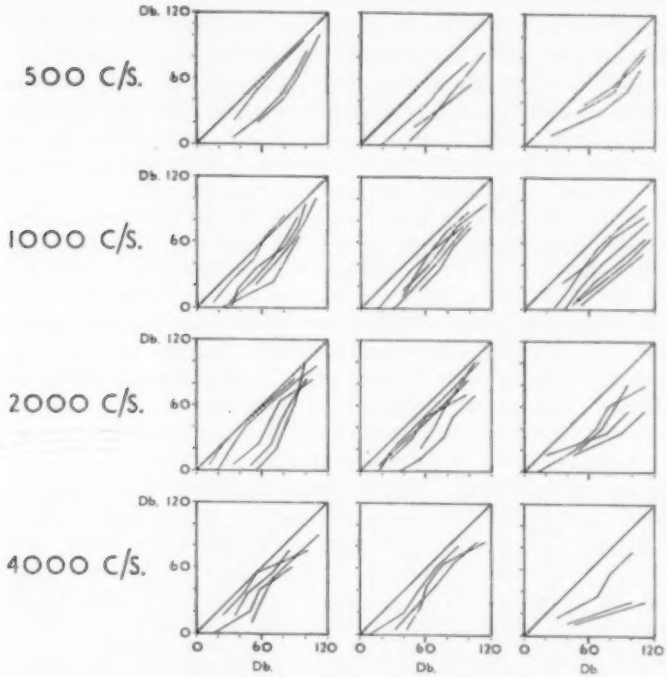

Fig. 4. Angle tumours. Group II.

ly absent in VIIIth nerve tumours, the loudness recruitment test has continued to provide a most valuable means for the differentiation of cases of perceptive deafness into two classes, end-organ deafness and nerve fibre deafness. A complete list of other investigators who have substantiated these findings would be a long one, but the following seem particularly de-

serving of reference: Lundborg (1952), Möller and Nenzelius (1957) in Sweden, Kristensen and Jepsen (1952) and Thomsen (1955) in Denmark, Lüscher (1950) in Switzerland, Hahn (1954) in Italy, Zangemeister (1950), Jatho (1956) and Stenger (1956) in Germany, Ireland (1949) in Canada, and Riesco MacClure (1957) in Chile; and finally, Segal and Hociota (1957) in Roumania. In the United States, too, an increasing and formidable body of evidence has been accumulated by observers including Saltzman (1949), Eby and Williams (1951), Jerger (1952), Schucknecht and Woellner (1955), Yantis (1955) and Goodman (1957). Finally, Simonton (1956), in a paper published from the Mayo Clinic, reports findings very reminiscent of our own, in which he describes the disappearance of loudness recruitment following the removal of a small tumour. He agrees with us in attributing the loudness recruitment to end-organ damage, resulting from interference by the tumour with the cochlear blood supply.

In this country few contributions seem to have been made, and Denny (1955) has described the test as "not giving much assistance," the reason given being that absence of loudness recruitment in cases of VIIIth nerve tumour is not a constant finding. This we consider an unreasonable view. After all, very few diagnostic tests can be relied upon to give 100 per cent results. Yet, in some respects, the diagnostic significance of the loudness recruitment test is as high as this. Thus, our own figures, well supported by others, show that the test is positive in 100 per cent of cases of Ménière's disease, and negative in 90 per cent of cases of VIIIth nerve tumours. A negative result, therefore, gives odds approaching the infinite against Ménière's disease. A positive result gives odds of nine to one against a tumour. There can, we think, be few diagnostic tests which give results more decisive than this.

Bone Conduction.—Another group of tests of great importance in the investigation of cochlear function is that of bone conduction. While the loudness recruitment test is indispensable in differentiating the two great categories of perceptive deafness, end-organ deafness and nerve fibre

deafness, the diagnosis of perceptive deafness must first be established, and for this we are still vitally dependent upon the bone conduction tests.

Up to some ten years ago, references were to be found in the literature describing the occasional occurrence of true conductive deafness in cases of VIIIth nerve tumour. The tests were carried out in the classical manner with tuning forks, and evidence of satisfactory masking procedures was rarely provided.

We (Dix and Hallpike, 1950) have described two cases of VIIIth nerve tumours, examined some two years earlier, in which we had encountered evidence of conductive deafness. In both of these cases the Rinne test gave what appeared to be true negative results.

We endeavoured to explain this conductive deafness in terms of a rather unusual albuminoid coagulum within the labyrinth. We used for our masking a hissing noise delivered to the unaffected ear from a speaking tube. This, at the time, was the best technique available, and we know now that its masking efficiency is inadequate. Since then electronically generated masking noises have been used, and for a number of years we have relied entirely on the narrow-band type of masking noise described by Hood (1957).

Since we have had this invaluable facility at our disposal, we seldom use the tuning forks for the evaluation of hearing by bone conduction, and have never seen a case of VIIIth nerve tumour in which there was any evidence of conductive deafness. So far as we know, the deafness of VIIIth nerve tumours is always of the perceptive type. We tell this story of our experiences, and of our change of views, since it illustrates in a manner which could not be bettered the extent to which efficient otoneurological diagnosis is dependent upon up-to-date audiological methods.

VESTIBULAR FUNCTION.

We are in agreement with others that the early vestibular symptoms of VIIIth nerve tumours take the form of a sense

of imbalance and unsteadiness of gait, and this was complained of in 73 per cent of our 70 cases. Complaints of vertigo were only made in 49 per cent. The term "vertigo" is not restricted to the paroxysmal kind of attack typical of Ménière's disease, and this we found to be of rare occurrence.

Stance and Gait.—Tests for ataxia of stance and gait are important. These are carried out with the eyes closed and open. Abnormalities were present in 77 per cent of our cases, though it must be added that their localizing value is by no means always clear cut.

Spontaneous Nystagmus.—Examination for spontaneous nystagmus is of very great importance, and considerable ex-

TABLE II.

Spontaneous Vestibular Nystagmus in 95 Subjects with Verified Angle Tumours.

Character of Nystagmus	Group I Acoustic Neurofibromata	Group II Other Angle Tumours
To contralateral side only	20 (29%)	9 (36%)
To ipsilateral side only	1 (1%)	0
To both sides	36 (51%)	8 (32%)
Nystagmus absent	13 (19%)	8 (32%)
Total	70	25

perience is often needed to detect it in its early stages when it is often of high significance. The eyes must be observed under good diffuse lighting with the gaze directed straight ahead and deviated to left and right to points just within the limits of binocular vision. Spontaneous nystagmus was present in 81 per cent of our cases in Group I as shown in Table II.

The findings have been considered in relation to the stage of development of the lesion, and it is fairly clear that nystagmus to the unaffected side is the first to appear, followed, as the tumour progresses, by nystagmus to the affected side. In some subjects we observed the development of this nystagmus over a period. When first detected it is of the first degree only, that is to say, it occurs only when the eyes are directed towards the unaffected side. Later it becomes of

second degree, that is to say, present also in the straight ahead position of gaze. At this stage it usually is accompanied by first degree nystagmus towards the affected side. The findings seem to indicate that these two kinds of nystagmus, contralateral and ipsilateral, are due to lesions of different anatomical structures, which are affected in a particular sequence. The structures whose derangement is responsible for the contralateral nystagmus are probably certain of the vestibular nuclear elements within the brainstem. As to the structures which are concerned with the ipsilateral nystagmus, less can be said. The evidence, however, would seem to point to certain of the cerebellar elements.

Positional Nystagmus.—Positional nystagmus is another physical sign of great importance and interest. It is, however, a specialized subject which cannot be included in the present contribution.

Caloric Tests.—Lundborg (1952), in his extensive study of 300 proved acoustic neuromata, described the caloric as the most valuable of the tests of vestibular function. He stated that the results were abnormal in 84.2 per cent of his subjects and normal in 15.8 per cent. Revilla (1947) also, in his review of 145 cases, found 6.8 per cent of normal caloric results.

Our own results have shown the caloric tests to give abnormal results in 100 per cent of cases, and we regard the test, performed as we perform it, as indispensable.

The reason for the discrepancy between our findings and those of other workers arises, we feel sure, from differences in technique. Lundborg used 10 to 20 cc. of water at either 27° C. or at 47° C., while Revilla used cold water only. We think it essential to use both cold and hot water at 30° C. and 44° C., as described by Fitzgerald and Hallpike (1942), and to interpret the results in accordance with certain principles which would seem to us to be reasonable and well founded. As explained in a number of publications since 1942, abnormalities in the pattern of the caloric test responses may take one of three possible forms: there may be a canal

paresis; there may be a directional preponderance to the opposite side; or the two may be present in combination.

In Fig. 5 are shown these three possibilities, as they may be found in a tumour of the right VIIIth nerve. There may be right canal paresis (1), there may be a directional preponderance to the opposite side (2), or the two may be combined (3). The way the combined pattern (3) arises is easy to understand if we introduce into the directional preponderance pattern (2), a right canal paresis (1). The right cold response is then brought back to the point shown by the white

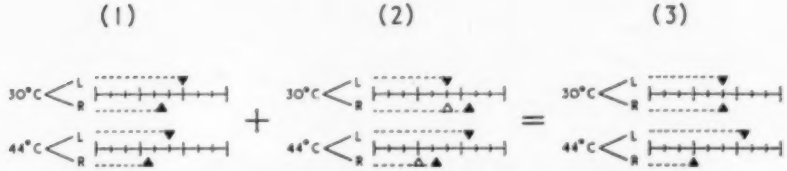

Fig. 5. (1) Right canal paresis. Lesion of right canal elements. (2) Directional preponderance to left. Lesion of right tonus elements. (3) Combined lesions of right canal and right tonus elements.

triangle and the cold responses are thus made equal and apparently normal (3).

The right hot response again is brought back to the point shown by the white triangle, and the hot responses are thus widely separated (3). Consideration of these three patterns shows very clearly that cold stimulation alone will give the true answer only in cases of canal paresis (1). If there is a directional preponderance (2), then the cold responses would be misleading, since they would seem to show sensitivity loss of the left or unaffected labyrinth. Similarly with the combined pattern (3) the cold responses again give a misleading impression, namely, that the labyrinths react equally and normally.

The results of our caloric tests are shown in Table III. They are 100 per cent abnormal. It may be seen that in 15 of our 95 cases exhibiting directional preponderance or a combined pattern, the results obtained with cold stimulation

alone would have appeared entirely normal, or would have appeared to give a better response from the affected labyrinth. This, we feel sure, is the explanation of normal caloric responses reported by Lundborg and others in VIIIth nerve tumours.

DISCUSSION.

We come now to certain wider problems connected with the otoneurological diagnosis of VIIIth nerve tumours. These we shall endeavour to outline in a series of questions which from time to time are put to us, directly or indirectly, by

TABLE III.

Abnormalities of Caloric Responses in 95 Subjects with Verified Angle Tumours.

	Group I Acoustic Neurofibromata	Group II Other Angle Tumours
Canal paresis (total)	58 (83%)	8 (32%)
Canal paresis (partial)	7 (10%)	7 (28%)
Directional preponderance	0	3 (12%)
Combined	5 (7%)	7 (28%)
Total	70	25

neurologists and otologists with practical interests in the clinical value of the modern diagnostic tests which we use.

The first question is: to what extent is the diagnostic evidence which they provide really indispensable? For instance, is it not true that in the majority of cases the demonstration of deafness will call for no special audiometric equipment, and that the simple observation of spontaneous nystagmus and the results of an ice-water caloric test will provide all we need to know of the vestibular dysfunction? If so, then such tests could be performed in any unspecialized aural clinic, and indeed the neurologist who is generally in charge of the case could well apply them himself and integrate their results with the neurological signs and symptoms which form an essential part of the clinical picture. Where, here, is the need for any highly specialized neuro-otological investigation? The question, arising as it does from prevailing clinical ex-

perience of these tumours with advanced deafness, spontaneous nystagmus and other neurological signs, is a perfectly reasonable one; and indeed, nothing has done more to discredit neuro-otology in the past than the unreasonable use in cases of this kind of over-elaborate diagnostic tests, in particular the rotational tests.

Our answer is that although these tumours are commonly presented for diagnosis in this advanced stage they should, if we look to the future, be seen much earlier, that is, in their otological stage, when their effects are for the most part limited to the VIIIth nerve elements. During this stage they will be detected by means of modern tests and by these alone.

The second question arises from what has just been said. Are we quite right in concluding that many of the tumours do pass through this purely otological stage? The affirmative answer, which we feel able to give, is based in part upon the evidence of histopathology, and in part upon clinical experience.

Let us consider first the neurofibromata of our Group I. The prevailing view of their pathogenesis, based chiefly upon the work of Henschen (1910, 1915) is that they arise from the neurilemmal portion of the vestibular nerve within the porus acusticus. Our own clinical data, being derived in the main from fairly advanced tumours, do not yield any decisive evidence as to the exact site of origin of the tumours. Nevertheless, some useful information is provided. Thus, in the 47 subjects whose audiograms are shown in Fig. 1, there was, as shown by these audiograms, a substantial preservation of cochlear function. In 83 per cent of these, however, the caloric responses were completely abolished, and in another 17 per cent they were severely reduced.

Partial loss of trigeminal function and other neurological disturbances were present in most of these cases in varying degrees. Nevertheless, the dominant note of the overall clinical picture is quite clearly indicative of a lesion having its maximum effect upon, and therefore originating in, the vestibular elements of the VIIIth nerve. We would expect, therefore, upon the evidence of these findings that all these

tumours did, in fact, pass through an early otological stage in which their effects would be substantially limited to the VIIIth nerve, particularly its vestibular elements.

As regards the other tumours of our Group II, the story is a different one. Since the VIIIth nerve is not primarily involved, the VIIIth nerve signs are less in evidence than the neurological signs. Thus, good preservation of hearing is more likely to occur with incomplete loss of the caloric responses. Indeed, it is our experience of these tumours that some such unusual balance between the otological and neurological abnormalities often provides a useful key to their diagnosis. It need hardly be said that here again much depends upon the precise evaluation of cochlear and vestibular function by means of modern tests.

The next question is this: Granted the value of modern tests for the early diagnosis of these tumours, is the course of the surgical treatment greatly influenced thereby? This question may seem a peculiar one. Nevertheless, it is not without practical significance. Thus, in some subjects in whom we have made the diagnosis in advance of the appearance of any severe neurological signs such as nystagmus, surgical treatment has been considered inadvisable; the opinion being held that in the absence of urgent indications such as papilloedema, the known post-operative morbidity makes it wiser to leave the tumour undisturbed. Now it is not really for us to provide the answer to this contention. Nevertheless, we feel bound to point out that it appears to be based upon the experience of the post-operative morbidity in advanced tumours. Experience of the post-operative morbidity in small tumours is unfortunately not yet widely available, but from such that we have, that is to say of tumours operated upon before the appearance of any evidence of brain-stem distortion, the post-operative morbidity is little more than that encountered following a section of the VIIIth nerve for Ménière's disease (Elliott and McKissock, 1954). The real difficulty at present is, we feel sure, that not enough of these cases are presented for diagnosis in their early, or otological stage.

Having decided that the early diagnosis of these tumours is an essential factor in their effective surgical treatment and that this early diagnosis depends largely upon modern oto-neurological tests, we return finally to the question "What exactly are these tests, and what special technique and equipment do they require?" The subject needs no more than a swift review.

The Tests of Vestibular Function.—Here, the caloric tests are of prime importance. Of their principles and practice no more need be said.

The Tests of Cochlear Function.—For the establishment of the perceptive character of the deafness, reliable bone conduction tests are essential. These are impossible in many cases unless the correct masking procedure is employed. This involves the use of insert receivers and narrow-band masking noise, as described by Denes and Naunton (1952) and by Littler, et al. (1952), and more recently developed by Hood.

The Loudness Recruitment Test.—Here, again, special apparatus is required, of which the principles and their applications have been specified and fully described in a number of publications (Dix, et al., 1948; Dix and Hallpike, 1949; Hood, 1950; Dix and Hood, 1953; Hood, 1954).

Test Equipment.—No serious difficulty would seem to arise in the case of the caloric tests. We have for years used a simple douche can and thermometer, but thermostatically controlled tanks make the work easier. These are readily obtainable and we warmly recommend their use.

More serious problems arise in connection with the equipment needed for special tests of hearing. In our clinic practically all of the equipment we use has been designed to accord with certain theoretical principles, and has been constructed accordingly in our laboratories. In our hands it gives excellent results, and these provide the basis of a number of contributions published in the course of the last ten years relating to a variety of problems of cochlear and vestibular function in health and disease.

On the whole, our results have been substantiated; latterly,

to an increasing extent by other workers. There is, however, no doubt that difficulties have arisen and it seems reasonable to suggest that they are attributable to some extent to the lack of the special equipment which we know to be such a vital necessity. Certainly we can say of any commercially available audiometers that in none is there yet provided any narrow-band masking for the performance of bone conduction tests; while facilities for loudness recruitment tests, when available at all, are nearly always quite inadequate.

Although the stress which we lay upon these various technical difficulties may seem very strong, we nevertheless consider it fully justified. If the otologist is to play his part, and play it well, in what we regard as an important and expanding field of work, he must have at his disposal up-to-date and efficient electro-acoustic and other equipment. There is no difficulty in specifying what this equipment should be, or its performance, and we hope that before long it will be properly standardized and made generally available.

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OTOLOGICAL FUNCTIONAL MICRO-SURGERY POST GRADUATE COURSE.

A practical course of surgical techniques in otological surgery will be conducted by Dr. Michel Portmann at the University of Bordeaux, France, Ear, Nose and Throat Department, June 26 to July 5, 1960. This course will be given in English.

The number of assistants will be limited to twenty, divided into two groups. The fee of $100.00 is to be paid at the Faculty of Medicine of Bordeaux, at the beginning of the course. Applications should be sent to Dr. Michel Portmann, 45 Cours Foch, Bordeaux, France.

SOME PRELIMINARY OBSERVATIONS ON THE EFFECT OF GALVANIC CURRENT ON TINNITUS AURIUM.*

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INTRODUCTION.

Galvanic stimulation has now been used for many years as a supplementary test for vestibular function. The effects of this type of current on auditory activity are less well known. It has been reported that galvanic stimulation can produce tinnitus in the ear on the same side as the cathode, but there seems to be no detailed study on this phenomenon.

Our interest in this problem arose when it was found that, in some cases, during routine galvanic stimulation tests, tinnitus could be increased or decreased in intensity according to the polarity of the current. Our interest was further stimulated by the results of Tasaki and Fernandez[9] on the effects of DC currents on the cochlear microphonics and action potentials recorded from guinea pigs. In view of the fact that their results suggest that the currents they used acted on the sensory receptors themselves rather than on the nerve or more centrally, we wondered whether galvanic stimulation may be able to distinguish tinnitus due to peripheral causes from that due to central causes. The extent to which this question has been answered so far is reported in this paper.

METHODS.

Thirty-three patients were studied. All of these patients

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complained of "noises in the ear(s)." Each patient had complete ear, nose and throat examination that included a detailed audiometric survey in addition to gross neurological and static labyrinth investigation.

The test was carried out in a sound treated room so that ambient noise would not detract from the patient's ability to hear his own tinnitus. The subject was first asked to match his tinnitus for both frequency and intensity by presenting various sample tones and mixed noises in the sound field. The electrodes, which consist of a round 1" diameter electrode and a 2" pad type, were then applied to the following eight positions:

1. Anode on right zygomatic arch, cathode in left hand.
2. Reverse of No. 1.
3. Anode on left zygomatic arch, cathode in right hand.
4. Reverse of No. 3.
5. Anode on right zygomatic arch, cathode on left zygomatic arch.
6. Reverse of No. 5.
7. Anode on zygomatic arch, cathode on ipsilateral mastoid.
8. Reverse of No. 7.
   (Smaller electrodes ⅛" and ¼" diameter are used for No. 7 and No. 8).

Each patient in this series had already experienced the galvanic test for labyrinthine function, so that he was aware of the sensations of vertigo, tingling and copper taste caused by the current. In no case was any suggestion made as to the possible effects of the current, but the patients were asked to report any change in their tinnitus they might experience. Repeat measurements were made, not only during the test, but also when the patients returned to the clinic several weeks or months later. Only those patients whose responses were definite and repeatable were included in the group denoted as giving positive results.

RESULTS.

Fifteen patients reported changes in the intensity of the tinnitus accompanying changes in the current strength. Group A (see Table I) shows those patients whose tinnitus was affected by the current, while Group B (see Table I) consists of those in whom no effect was produced. In those patients who had unilateral tinnitus, the anode on the side of the tinnitus would produce a decrease in the intensity of the

TABLE I.

Results of Galvanic Stimulation Effect on Tinnitus Aurium in 33 Cases Classified as to Hearing Loss.

Diagnosis	Conductive	Hydrops	Post-Infect.	Skull Fract.	Noise Trauma	Presbycusis	Unknown	Normal
Group No. 1*— (affected)	2	2	2	1	1	1	6	0
Group No. 2†— (no effect)	1	0	0	0	3	10	2	2

*Group No. 1—Subjects whose tinnitus was affected by the galvanic stimulation.

†Group No. 2—Subjects in whom no effect was produced.

tinnitus, in some cases total suppression, as the strength of the current was increased. This suppression would last throughout the duration of the stimulus and, as the current was gradually reduced to zero, the tinnitus would gradually return to its former intensity.

The current strength at which the total suppression of the tinnitus was reported varied from 1.5 mA in one patient to 8.8 mA in another. It was a common finding, however, that once the subject had reported that the noise was diminishing in intensity, it disappeared entirely within 1.0 mA. Conversely, with the cathode on the tinnitus side, the opposite effect was obtained, *i.e.*, the tinnitus would increase in loudness as the current was increased and would return to its former level as the current was reduced gradually to zero. Threshold values of the change in the tinnitus were the same

for both the increase and decrease of the current. In those patients with bilateral tinnitus the results were of the same pattern: if the anode were on the right zygomatic arch and the cathode on the left, tinnitus in the right ear would fade, while that in the left ear would become relatively louder as the current strength was increased. There were four patients who had had occasional tinnitus, but who had no tinnitus at the time of the examination. In these four cases, it was possible to produce tinnitus in the same ear by cathodal stimulation. Each subject reported that the noise so produced was the same as that previously experienced.

The cases summarized below illustrate our results:

Case 1. L. B., a colored female, 22, CNS lues. Tinnitus in right ear: ringing, steam escaping. Tinnitus in left ear; motor noise synchronous with pulse beat. Audiogram shows speech reception threshold (SRT) of 95 db in both ears; discrimination score, AU, 0 per cent. Caloric tests show hypocative labyrinth. Hearing loss has been progressive since 1957. Anodal current decreased the tinnitus while cathodal current increased the tinnitus in respective sides.

Case 2. V. S., white female, 48. Normal hearing until skull fracture in 1941. Tinnitus; low-pitched roar, AD. Audiogram shows no serviceable hearing in right ear while left ear is normal. Caloric tests reveal marked hypocative right labyrinth with normal left side. Galvanic test: tinnitus abolished with anode on right zygomatic arch (Positions 1, 5, 7); marked increase in the tinnitus with cathode on right zygomatic arch (Positions 2, 6).

Case 3. L. C., white male, 51. Endolymphatic hydrops (Meniere's). Tinnitus in left ear described as whistle. Left ear has flat nerve loss of 60 db, discrimination score of 14 per cent, complete loudness recruitment, marked tone decay and diplacusis. Right ear normal. Caloric tests show hypocative left labyrinth and normal right labyrinth. Galvanic test: anode on left zygomatic arch, (Position 3) produced change in the tinnitus; cathode on left zygomatic arch (Position 4) produced marked increase in the whistle. When anode was placed on left zygomatic arch and the cathode on the right zygomatic arch (Position 6) the whistle was heard in both ears.

Case 4. H. C., white female, 48. Bilateral otosclerosis with nerve involvement in left ear. Tinnitus; bilateral low pitched roar heard more in left ear. Audiogram shows a 35 db conductive loss with 98 per cent discrimination in right ear; a 70 db mixed loss, discrimination score 88 per cent in left ear. Caloric tests were normal bilaterally. Galvanic test: with anode on left zygomatic arch (Position 2, 6) the tinnitus in left ear was abolished; with cathode on left zygomatic arch (Position 4, 5) the tinnitus in left ear was increased. There was no effect on the tinnitus in right ear from any electrode positioning.

DISCUSSION.

There are two main difficulties in the interpretation of the

results; namely, *1.* that we are uncertain of the site at which the current may exert its effect; *2.* that tinnitus aurium can be due apparently to a number of separate factors.

If we could assume that the current produced its effect mainly at the cochlea, then our findings could be explained on the basis of those reported by Tasaki and Fernandez[9] and Tasaki, Davis and Eldredge.[10] These authors showed that a DC polarizing current, with the positive pole in the scala vestibuli and the negative pole in the scala tympani, increased the amplitude of the cochlear microphonics relative to the amplitude of the responses when no current was applied. When the polarities were reversed, however, the amplitudes of the cochlear microphonics were depressed. The amplitudes of the action potentials of the VIIIth nerve—judged by the heights of the N1 responses—were similarly affected by the polarizing current. Tasaki and Fernandez point out that their observations are similar to those from experiments on other sensory receptors and that the applied current affects the process of initiation of the propagated nerve impulses in the sensory nerve fibers and not the processes of conduction. We might, therefore, speculate that in some cases of tinnitus aurium of peripheral origin, the pathological process may have caused the resting membrane potential to be raised to critical levels for firing propagated nerve impulses. In these cases, the anodal current could conceivably reduce the value of the resting membrane potentials to levels below those which trigger the propagated impulses. The fact that the current appeared to affect only the tinnitus rather than auditory acuity for all frequencies tends to support the above idea; thus, those cases in which no result could be obtained, would suggest that the current did not reach those parts of the cochlea concerned with the tinnitus, or if it did reach the cochlea, it was not of sufficient strength to change the membrane potential effectively. It is also probable that in some of these cases (presbycusis) the tinnitus was not of peripheral origin.

This thesis, however, must be tempered by the fact that there is some evidence that galvanic stimulation may exert its effect centrally. Dohlman[3] has stated that the absence of

the galvanic response is due to a degeneration of cells in the ganglia vestibulare and their central connections. More recently, Dix, Hallpike and Harrison,[2] and Ingelstedt and Walander[6] found that if the peripheral vestibular apparatus was damaged by streptomycin, the galvanic current could exert its effect on the vestibular nuclei. On the other hand, other data have been presented by Mackenzie,[7] and Glorig and Fowler[5] which indicate that the galvanic current is effective only peripherally. If, as seems likely, high intensities of current reach the central structures, it would be difficult to see how the current could be so specific in its action according to its polarity. It may be, of course, that an anodal current will decrease the values of the membrane potentials of the neurons in the central nucleus which are responsible for the tinnitus, in the same way as was suggested for the peripheral action of the current. On the other hand, the current may in some way be stimulating efferent fibers and modifying the sensory input to the central nervous system, an idea that appears plausible from the anatomical findings of Rasmussen,[8] and the physiological studies reported by Galambos.[4]

Whatever the mechanism may be, we agree with Dohlman's suggestion (personal communication) that electrophysiological studies should be carried out to determine the patterns of discharge of single neurones in central structures in response to DC polarization of the cochlea.

It does not seem probable that the effects reported could be due to anodal block of the nerve fibers, for the current strengths do not seem to be high enough to produce such results. This fact is emphasized by Tasaki and Fernandez in their studies.

It is interesting to note that in Table I but one out of 11 patients with presbycusis reported change in his tinnitus when the current was applied. This, perhaps, may be explained on the basis that tinnitus accompanying presbycusis is of central rather than peripheral origin. This interpretation, of course, cannot be substantiated at the present time. Another interesting and, perhaps significant, observation in this series was the fact that the majority of patients whose

tinnitus could be affected by the galvanic current had severe hearing losses.

Davis[1] has maintained that "there must be some regulatory mechanism to adjust the excitability of the nerve fiber and the strength of the resting current to levels very close to the threshold of stimulation. Disturbance of this 'homeostatic' mechanism in one direction would cause loss of sensitivity. Disturbance in the opposite direction would give tinnitus." Our results would agree with this idea for most of the cases which we studied, for we feel that the galvanic current must be affecting this regulatory mechanism, whatever it may be. We do not, of course, claim any therapeutic value for these cases, but we do feel that this method provides a useful physiological tool for the study of a condition for which experimental animals cannot be used.

SUMMARY.

1. The effects of galvanic stimulation on tinnitus aurium in 33 patients are discussed.

2. Fifteen patients reported changes in the intensity of the tinnitus according to the polarity of the current. If the anode were placed on the zygomatic arch on the side of the tinnitus, the intensity would decrease as the current was increased; conversely, with the cathode on the affected side an increase in the current strength would produce an increase in the tinnitus intensity.

3. Eighteen patients reported no change in the tinnitus from galvanic stimulation.

4. These results are discussed with reference to tinnitus of possible peripheral and central origins and also in relation to recent experimental cochlear studies by others.

We thank Professor David Myers for his kind encouragement, and Professor G. Dohlman for his helpful discussion.

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WEST VIRGINIA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

The West Virginia Academy of Ophthalmology and Otolaryngology will hold its annual meeting at the Greenbrier Hotel, White Sulphur Springs, W. Va., from April 10 to 12, 1960.

Among the guest speakers will be: Dr. Harold G. Scheie, Professor of Ophthalmology, Pennsylvania University School of Medicine, Philadelphia, Pa.; Dr. Charles E. Iliff, Associate Professor of Ophthalmology, John Hopkins University School of Medicine, Baltimore, Md., and Dr. Oscar T. Becker, Clinical Associate Professor of Otolaryngology, University of Illinois, Chicago, Ill.

For any additional information please contact the secretary, Dr. Albert C. Esposito, First Huntingon National Bank Building, Huntington 1, W. Va.

THE IMPORTANCE OF HEARING AT 3 KC FOR UNDERSTANDING SPEEDED SPEECH.

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For some time we have been bothered by a discrepancy between the relatively low frequency cut-off which allows low-pass filtered speech signals to be understood well by the normal ear, and the somewhat higher frequency region at which individuals seem to need to hear in order to operate well in everyday life.

In the classic paper on speech intelligibility by French and Steinberg[1] it is shown that for one set of typical talkers and listeners a syllable articulation of 95 per cent correct was achieved when all frequencies above about 4,500 cps were eliminated; however, when the effect of words, especially polysyllabic words is added to the situation, or even when these words are put into sentences with all the mnemonic, redundant, symbolic, and evocative associations and rules of human language, the frequency effect seems to change.

The effect of low-pass filtering on speech sounds has been attacked by Hirsh, et al.,[2] who showed that eliminating all frequencies above 1,800 cps reduced nonsense syllable articulation to 73 per cent, but polysyllabic words in isolation remained high at about 97 per cent; indeed, polysyllabic words in isolation remained at about 95 per cent even when all frequencies above 800 cps were eliminated!

Some data on sentence intelligibility using the same filters were summarized by these same workers. It is stated that sentence intelligibility is similar to polysyllabic words in isola-

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tion, in that scores of nearly 100 per cent are obtained with 800 cps low-pass filtering.

Such astounding results are repeatable in the laboratory, but they do not agree with clinical experience. An ear with an audiometric pattern sloping sharply off at 800 cps—or even an octave or more higher for that matter—can perhaps handle clearly spoken speech suitably amplified in the absence of noise or other distortion; but no one will question that such an ear will in many other situations operate well below normal. Every hearing clinic is filled with such individuals seeking help.

We have sought to resolve, or at least throw light on the discrepancy by presenting not clear but distorted speech to ears with audiometric patterns which simulate low-pass filtering. We fixed upon a speedup in words per minute as a convenient and illuminating type of temporal distortion. For this work we used sentences rather than words or syllables.

There are several reasons for preferring sentence intelligibility over word-, syllable-, or phoneme-articulation: first, especially important when working with patients rather than with trained listeners, the phonetic alphabet need not be used; second, with sentences it is easier to preserve the many natural transitions in connected discourse from one phoneme to another. This aspect of speech has recently been emphasized by several laboratories. The major reason for utilizing material other than sentences for assessing general speech recognition is a matter of time. Finally, with speeded speech the measurement of the speech unit per unit time is much more convenient.

Fletcher[3] made these points many years ago, and provided one transfer from sentence intelligibility to articulation as measured by syllables and letters. He had his laboratory construct 49 lists of 50 sentences each. Sentences were five to 12 words in length, each containing four or five "thought" words all essential to the full meaning of the sentence. The response to a sentence (each was cast in an interrogative or imperative form) could be scored right or wrong. An attempt was made to reduce intellection.

The relation of sentence intelligibility to syllable- and letter-articulation was specified by Fletcher (see p. 266). From these data one can predict, though with considerable error, sentence intelligibility from a knowledge of syllable- or letter-articulation as derived from nonsense syllables. The Bell laboratories in general used this conversion in their thinking, and have used nonsense syllables for the most part in assessing communications equipment. There were two reasons for this: first, as noted above, the testing time is much shorter; second, the sentence tests work well only in a rather narrow region of distortion; unless a system distorts rather badly, all sentences come through at or near 100 per cent. They obviously cannot be used to rank order an ordinary group of communications systems, or ears, all of which perform equally well.

A minor difficulty with these particular sentences is that they often demand quite good intelligence or special knowledge, of politics, current events, New York City geography, etc.

Lists of sentences have been built up from time to time by the Harvard Psycho-Acoustic Laboratory[4] and others for special purposes, such as the testing of communications in noise; but no list has as yet been published to meet the several demands put by our immediate requirements. We thus felt called upon to construct our own.

One hundred sentences of colloquial difficulty were written, about five to 15 words each, constructed of key words and ideas much as the Fletcher lists, together with a group of four words for each sentence in a multiple-choice response.

The rules for construction were:

a. Three key word-ideas per sentence.

b. Of the four responses offered on the answer sheet, only one could conceivably be correct if the whole sentence was understood.

c. If any one of the key words was missed, at least one and

usually two or three of the three other responses would offer a reasonable answer.

There were, of course, numerous exceptions to these very difficult response item requirements, but in the main the rules were followed. Mr. Robert Pettie and Mr. William Atkinson composed sentences and responses. Their sentences were dovetailed to compose the full list (see Appendix A).

A speaker with general American dialect, who habitually talks rather rapidly but with high intelligibility, and who was able to attain much faster speeds was chosen. He read these hundred sentences repeatedly into a Western Electric 640AA microphone connected to the Western Electro-Acoustic Company condenser microphone complement and thence directly to an Ampex 300 tape recorder. About five seconds elapsed between sentences. On several readings the speaker read just as fast as he could, while still articulating each phoneme approximately correctly. On several other readings he slowed a trifle, then more, and so on. These tapes were then analyzed on the Sound Apparatus Company sound level recorder, words per minute computed (neglecting, of course, pauses between sentences) and a selection made representing a distribution of speeds of 345, 330, 324, 316, 300, and 280 words per minute, Tests A-F respectively.

It was ascertained, by administering certain of these tapes to large groups of young men with normal hearing and with an IQ of 100 or better, that test-retest reliability was as good with 50 of these sentences as with 100. Accordingly each tape was split into Forms 1 and 2 of 50 sentences each, so that at each speed an alternate form was available.

A group of 25 men as described above was given Forms 1 and 2 of the two fastest speeds. No audiometric loss existed greater than 15 db in the 500-3000 cps range. The tapes were played 40 db over threshold for the normal ear. Table I shows a distribution of per cent intelligibility and other information on these tests.

The mean difference between Tests A and B is significant at less than the .01 level, while the mean difference between

Forms 1 and 2 for neither A nor B is significant at the .05 level.

In summary, we had shown that even with what is considered extremely rapid speech one can expect normal listeners to do quite well so long as the talker maintains rather crisp articulation. (As a matter of fact, it is a question whether the drop from around 100 per cent to 82.4 per cent intelligibility is entirely due to the increased speed. Some, if not most, of the decrement is certainly due to an occasionally slurred or partially elided word or syllable.) Further, we

TABLE I.

Frequency Distributions of Scores on Speeded Speech

Tests A and B (N:25).
Per Cent Intelligibility Attained.

	100-98	97-95	94-92	91-89	88-86	85-83	Mean	Range
A, Form 1	3	3	7	6	4	2	80.8	70-98
A, Form 2	2	10	5	3	5		84.0	72-98
B, Form 1	6	11	8				88.4	84-98
B, Form 2	9	9	6	1			89.6	82-98

had tapes covering the range 280-345 words per minute, each with an alternate comparable form.

With these tapes and this information we were ready to test the hypothesis in the clinic that audiograms defective in the higher frequencies would do relatively poorly on these tapes, in the absence of central damage.

Patients were collected, one at a time, who possessed the audiometric patterns necessary and who gave no evidence whatever of central damage and were far from senile. Each was given a complete oto-audiologic workup and then given Test A (either Form) at a level about 40 db over his 50 per cent threshold for the PB lists.

In a group of six men (eight ears) with no audiometric loss greater than 15 db through 3 kc, but with losses of 20 to 85 db at 4 kc, no disturbance of speeded-speech reception was seen. The average per cent correct for Test A was 84.5 per cent, range 76 to 94. This is indistinguishable from the

results in Table I with perfectly normal ears and indicates beyond real doubt the irrelevance of 4 kc in this connection.

In a group of 19 men (22 ears) with no loss greater than 15 db through 2 kc, but with losses of 20 to 65 db at 3 kc, some real disturbances occurred. Mean score was 69.4 per cent correct. Low scores were found in four ears even though the loss at 3 kc was only 25 db. These four cases are graphed

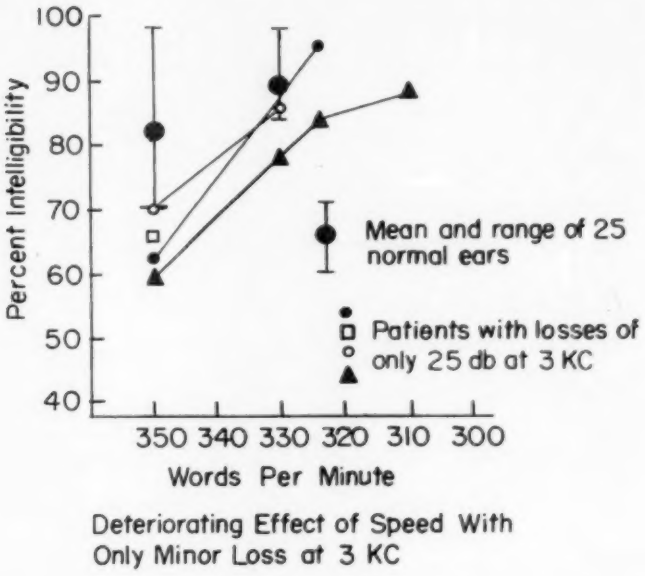

Fig. 1.

in Fig. 1 together with the means and ranges for the normal-hearing group. These men all scored at least 10 per cent below the mean on Test A, and all below the lowest man on Test A in the normal-hearing group.

In Fig. 2 is graphed the relation between audiometric loss at 3 kc and per cent correct on the fastest speech tests. Of seven ears with losses of 40 db or more, five yielded scores

10 per cent or more lower than the worst man in the normal-hearing group.

It is noteworthy also that in this group of 22 ears only seven scored 80 per cent or better, the highest score yielded being 88 per cent correct; whereas in 36 per cent of the normal-hearing group the scores were 90 per cent correct or

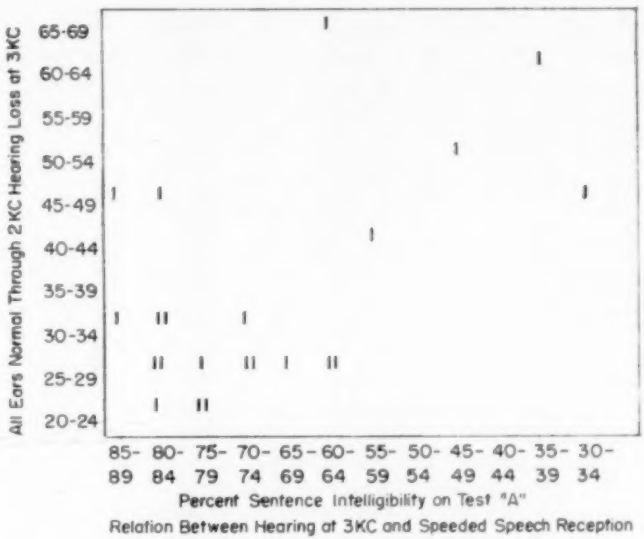

Fig. 2.

better. There is very little overlap between these two groups. The difference between means is, of course, highly significant.

The conclusion seems obvious that a normal or near-normal audiogram at 3 kc is essential for high sentence intelligibility if stress is put upon the speech signal through a speed-up.

If hearing at 3 kc is essential for full efficiency on speeded speech, hearing at 2 kc should be much more so. On another group of 13 men (17 ears) with no loss greater than 15 db at 1 kc, but with losses of at least 20 db at 2 kc, an even more

direct relationship is found. Fig. 3 shows the per cent intelligibility for these ears as it varies with loss at 2 kc. All but one of these ears (and it with least loss) are far below normal performance on Test A.

Yet, in spite of rather steep losses at 2 kc (note in Fig. 3 that ten of the ears had drops of 40 db or more), these ears

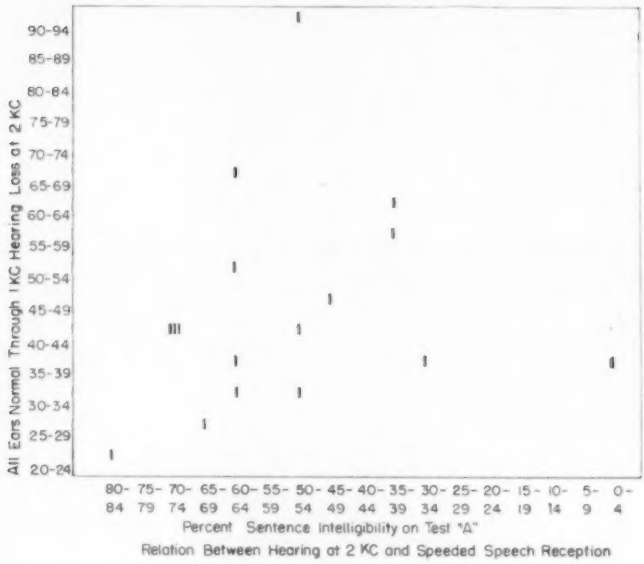

Fig. 3.

can handle ordinary speech quite well. Only four showed a loss of more than 15 db on the PB lists, and all reached a PB maximum of well over 80 per cent rather quickly; furthermore, time was taken to examine 11 of these ears with two or three speeds slower than Test A, and in nearly every case a quick rise to an intelligibility approaching the normal case was found.

Fig. 4 shows the rapid increase of intelligibility with slower

speed. Here, where each ear is its own experimental control, we see that the audiometric pattern, rather than such factors as lowered intelligence, poor language background, etc., can account for the relatively very poor performance on the faster lists.

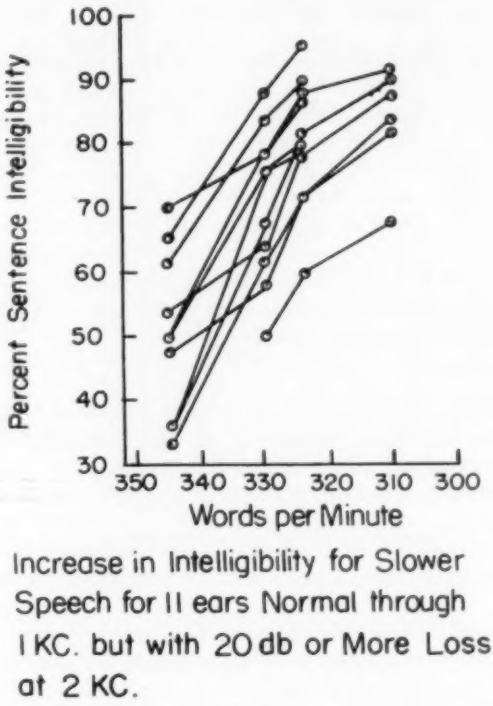

Fig. 4.

The mechanism of the decrement for intelligibility in consequence of an audiometric loss at 3 kc can be stated with some confidence. We reject the notion that frequency distortion *per se* is responsible, and accept the simpler explanation that about 15 per cent (84 minus 69.4) of the cues for sentence intelligibility are frequency-dependent upon the 3 kc

region. With slower inputs these lost cues can be compensated for by the heavy frequency-redundancy in speech, but at the word-rate of Test A the speech input is too rapid for this redundancy to operate very efficiently. By eliminating or reducing the possibility of using the redundancy in the speech signal, one can demonstrate the necessity of hearing in the 3 kc region for connected discourse.

Such a result brings connected discourse into approximately the position of phonemes as reported by Fletcher (p. 282 ff). With normal ears and filtering that eliminates all frequencies above 2500 c/s, the following individual speech sounds dropped to 85 per cent articulation or worse: t, k, n, z, ch, s, f, and th. Yet these represent some of our commonest phonemes, often keys to word intelligibility and consequently (though less often) to sentence intelligibility. It does not seem far-fetched to believe that sentence intelligibility should decline 15 per cent when these sounds are missed or confounded, providing one markedly reduces the opportunity for redundancy to operate.

Our two groups with sharp drops at 3 kc and 2 kc, suffice to show the special importance of the higher frequencies when speed stress is put upon the speech signal. For the rather redundant spondees in quiet, Glorig and his associates[5] have shown that the contribution of even the 2 kc region in hearing can pretty well be ignored, while Harris[6] has shown that while 2 kc contributes significantly to PB intelligibility, 3 kc does not. The conclusions of these workers should probably now be modified to re-emphasize the higher frequencies in thinking about the relation of audiometric pattern to speech reception in audiological counseling, compensation formulae, and hearing aid fitting, to name three areas.

To take only one of these areas by way of example, we may inquire whether the mathematical equations relating audiometric loss to the speech reception threshold should not be re-worked, using a variety of distortions in the speech signal, much as found in daily life. We are accustomed to listening to speech through very low-fi systems such as intercoms, public address systems, small radios, etc. We are

accustomed to speakers whose initial quality, including speed, is very debilitating. We are accustomed to speech in public buildings where noise-masking and reverberation are extreme. It would seem wise to include some examples of distortions such as these in any speech reception test purporting to simulate everyday conditions. Speeded speech may serve as a paradigm of these distortions. It is more than likely that our explanation for the present data, given above in terms of a reduction in the possibility of utilizing redundancy, can be generalized to the case of an actual loss of redundancy, as in reverberated (by masking) or interrupted speech. For all these conditions, the higher frequencies should perhaps receive a tilt upward in our reflections on the matter.

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APPENDIX A.

Form 1.

1. A grass-roots movement is likely to start:
   where there is wind with the soil very short **with people**
2. What drops from trees in the fall?
   rain **leaves** birds woods
3. The game of horseshoes can be won with:
   steel hoofs **ringers** ties
4. What shines in the sky at night?
   sun polish **stars** darkness
5. Ice formed at the edge of the roof by dripping water is called:
   heavy frozen **icicles** sheets
6. How much is two times three?
   two three five **six**

7. In the fall the most popular team sport in America is:
wrestling New York Yankees **football** October

8. Which coin is half of a dime?
nickel dime half-dollar dollar bill

9. A man's routine walk may be considered:
concrete sidewalk **a constitutional** the dog

10. Which is a city in New England?
Trenton **Boston** London Maine

11. A plane lighting on the deck of a carrier is most likely to be:
a pigeon a pilot **a Navy plane** brilliant

12. Which man was an American general?
Grant Wilson Napoleon Joan of Arc

13. Some inexpensively bound books issued periodically are called:
authors **magazines** news print

14. What color is the grass in the summer?
mown brown hot **green**

15. Cars that travel directly between mountains use:
waterways high-altitude high-octane gasoline **cables**

16. The country north of the United States is:
Canada Mexico North Dakota Norway

17. A pencil sharpener is very useful in:
turning **the office** shavings pointed

18. What do we look at on a watch to tell time?
eyes clocks **hands** ears

19. A woman wears pumps:
by hand water **on her feet** clothing

20. Which is a yellow citrus fruit?
apple lime **lemon** pear

21. Glass lenses worn over the eyes are called:
cameras clear windows **spectacles**

22. What does a secretary use to type letters?
typewriter envelope alphabet notebook

23. A very harsh solution called lye:
on the bed is to tell falsehoods **will burn the skin** sleeping dog

24. Bright is to dim as loud is to:
light **soft** sound hard

25. A square ring encloses:
impossible geometry wedding **boxers**

26. How much is five minus two?
two **three** five ten

27. One of the races to which people belong is:
running **Yellow** horses contest

28. If ears are for hearing, the nose is for:
seeing hearing tasting **smelling**

29. The largest thing living in the ocean is a:
ocean liner **whale** fish iceberg

30. The name of a European country is:
France Paris Berlin Uruguay

31. A coat worn by a man is likely to be made of:
oil mink paint **tweed**

32. How much is one plus three?
one two three **four**

33. A bear which lives near the North Pole is:
black penguin **polar** Arctic

34. Name a green leafy vegetable:
tree corn **spinach** grass

35. A large stringed instrument in an orchestra is a:
bass drum tennis racket tuba **bass violin**

36. If cats have kittens what do dogs have?
bark meow **puppies** fleas

37. To break which kind of record brings fame:
testimony phonographic files **athletic**

38. What do we wear on our feet when it rains?
socks mittens **rubbers** raincoats

39. To sign a letter is to add:
a plus Zodiac **one's name** billboard

40. Which farm animal is a bird?
horse **chicken** dog eagle

41. Some heavenly stars may be seen better:
in old movies with five points **with a telescope** quality

42. What has four wheels and a motor?
bicycle wagon **automobile** motorboat

43. A forward pass is made by throwing a:
between mountains not bidding proceed **football**

44. Complete the rhyme: One, two, button my:
shirt three **shoe** lip

45. A new broom sweeps:
floor **clean** money straw

46. Trains run on railroad:
model **tracks** locomotive stations

47. Many voices singing together make a:
choir song party duet

48. What green vegetable goes with carrots?
rabbits blue butter **peas**

49. A new pipe must be broken in:
by the smoker steel tobacco water

50. Underline the largest farm animal:
elephant pig **horse** whale

Form 2

1. A very expensive American-made car is:
the Ford Detroit money **Cadillac**

2. What month rhymes with remember?
September July ember Mother's Day

3. Ground in which plants are grown is called:
soil grain electrical circuit support

4. Which animal walks on two legs?
centipede **chimpanzee** dog tulip

5. The larger body of Congress is called:
House of Representatives politics legislation grave

6. Name a river in Africa that flows north:
Rhine **Nile** Mississippi Congo

7. The mouth-organ is known otherwise as:
anatomy teeth **harmonica** disease

8. A penny saved is a penny:
spent pinched **earned** bank

9. Five large inland lakes are called:
Great Lakes continental Hudson Bay Great Salt Lake

10. Name a European capital city:
Washington **Paris** Hartford Venice

11. Count by twos: Two, four, six:
four number count **eight**

12. What is the Gulf of Mexico?
body of water Spanish speaking country game gasoline

13. A club carried by a policeman while on duty is a:
social Policeman's Benevolent Association pistol **nightstick**

14. If I mix beans and corn I get:
pizza Suki-yake **succotash** Mexican corn

15. Precipitation which on striking the ground may bounce is called:
chemical snow ball **hail**

16. A stitch in time saves:
thread **nine** clothes clock

17. The kind of pitch which involves a catcher is to be found in:
evergreen trees tar **baseball** slope

18. If you had trouble seeing you would wear:
a hat **eyeglasses** better light hearing aid

19. The term Silent Service applied to military forces means:
quiet Army **Submarine Force** defense

20. Up is to down as high is to:
sky kite elevator **low**

21. Bill is the name for a statement of:
bird's beak a nickname poster **money owed**

22. A white fluid that you drink is:
snow **milk** kerosene coffee

23. The flag of the United States contains red and white:
stars **stripes** forty-eight thirteen

24. Some one a year older than twelve is:
eleven **thirteen** fourteen twelve

25. Which country has a female monarch:
Queen Juliana **England** never King

26. People who lived in ancient Rome spoke:
Greek Italian **Latin** Sanscrit

27. Quarters which are small and made of metal are called:
small pieces of meat **25-cent pieces** one-fourth rooms

28. Pedals are used when riding a:
flower **bicycle** horse rose

29. The type of match most likely to be carried by a person is:
a book-match wrestling identical items marriage

30. Name a cold country in the northern hemisphere:
Iceland Antartica Spain Hawaii

31. Hands which travel in circles are found:
wrists helping **on a clock** shaking

32. How many inches in a foot?
three shoes **twelve** socks

33. Mail delivered to your door is handled by:
boy babies chain open **postman**

34. How many two cent stamps in a dozen?
two **twelve** twenty-fours thirty-six

35. A large statue in New York harbor is:
Statue of Liberty the Empire State Building ocean liner law

36. Bible is the name of a:
book religion noise water

37. China is a country in the Far:
away **East** large enemy

38. Underline the insect that flies and stings:
ant robin moth **wasp**

39. A 3-dimensional object with equal sides is:
geometry in inches **a cube** barrel

40. What meal is one likely to eat at seven in the morning?
shave **breakfast** television dinner

41. A slight wavy motion on the surface of water is called:
hair-do gesturing surf **ripple**

42. The last car in a freight train is called:
locomotive convertible box car **caboose**

43. Material used to break up rock is called high:
cliff **explosives** ball jump

44. Which man is a Navy officer?
colonel **admiral** Wave policeman

45. Men employed by a city to put out fires are called:
firebugs commissioners smoking **firemen**

46. What holiday falls on a Thursday in November?:
Easter Labor Day **Thanksgiving** Monday

47. A figure with four equal sides is a:
equilateral triangle straight line geometry **square**

48. How much is four divided by two?
one **two** three four

49. The number of zeros in one thousand is:
three two-thousand fraction money

50. Which liquid is not a beverage?
milk **gasoline** lemonade beer

U. S. Naval Medical Research Laboratory, New London, Conn.

14 Broad Street, New London, Conn.

INTERNATIONAL POSTGRADUATE COURSE IN RECONSTRUCTIVE SURGERY OF THE EXTERNAL NASAL PYRAMID AND NASAL SEPTUM.

An international course in Reconstructive Surgery of the External Nasal Pyramid and Nasal Septum will be given in Mexico City July 4-15, 1960, under the auspices of the University of Mexico Medical School and its Postgraduate Department, in cooperation with the American Rhinologic Society, and under the direction of Dr. Andres Bustamante Gurria, of Mexico City. The guest professor will be Dr. Maurice H. Cottle, Chicago Medical School. He will be assisted by a faculty of otorninolaryngologists from the United States and Mexico.

Class membership is limited. Apply for registration information to Dr. Robert M. Hansen, Secretary, American Rhinologic Society, 1735 North Wheeler Ave., Portland 17, Ore.

FIBROUS DYSPLASIA WITH MONSTER-LIKE DEFORMITY.*

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Review of the literature on fibrous dysplasia (Lichtenstein and Jaffe,[1] Weinmann and Sicher,[2] Brunner,[3] and Hoboeck[4]) leaves one in the dark as to the true nature of the disease. Numerous etiological factors have been suggested: congenital anomaly of the bone forming mesenchyme, aberration of ossification in membranous bones of the skull, metabolic disturbance, trauma with abnormal local response, disturbed vascularization, hypothalmic lesion, endocrine dysfunction; but none appears to have solid, factual basis. Some authors (Stamm,[5] Davis[6]) include under "fibrous dysplasia" such conditions as osteoma, osteoid fibroma, ossifying fibroma; but others (Thoma,[7] Weinman and Sicher[2]) oppose strongly this view and consider fibrous dysplasia a distinct entity.

The salient clinical features of the disease are onset in childhood, slowly progressive course, and standstill on reaching maturity. One bone (monostotic form) or many bones (polyostotic form) may be affected, usually on one side of the body. Albright's disease, in which skeletal lesions are associated with cutaneous hyperpigmentation and precocious puberty, possibly represents a more severe form of the illness.

Lack of unanimous opinion as to the pathologic criteria by which fibrous dysplasia may be labelled as such, makes it rather difficult to ascertain the incidence of the disease and of its various forms. Involvement of a single bone, however, seems to be much rarer than that of multiple bones.

During the past three years we have observed six cases

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of fibrous dysplasia: three were monostotic, all affecting the maxilla; two were polyostotic, affecting skull and facial bones on the same side (one of these cases was described previously by Rosen, et al.[8]). The sixth case was one of Albright's disease.

Fig. 1. A monstrous deformity resulting from fibrous dysplasia.

A rather unusual example of the monosteotic variant affecting the left maxilla will be described.

Case 1. A male patient, aged 25, born in Iran and residing in Israel for the past five months, was seen for the first time in May, 1956. His family history was essentially negative.

At the age of 14, a small prominence appeared over the left nasal wall. The swelling increased gradually in size, expanding the face and dis-

placing the eyes sideways. Diplopia and nasal obstruction supervened and the patient had to keep his mouth constantly open. The mass ceased to grow at the age of 20 and remained stationary since. A year prior to admission the patient noticed a superficial sore over the prominent part of the tumor which failed to heal.

The monstrous appearance excluded the patient from social contacts, and he had to stop school attendance; nevertheless he succeeded in learning to read and write (both his sisters are illiterate). Since his

Fig. 2. A monstrous deformity resulting from fibrous dysplasia.

arrival in Israel he was confined to a back room, going out only in the evening, the left half of his face covered with a shawl.

On seeing the patient for the first time the reaction was mostly one of shock, repulsion and unbelief. The patient's condition was poor, but except for the head, he was normally and proportionately developed. The head was monstrous (see Figs. 1, 2, and 3); the eyes were pushed widely apart, looked sideways and bulged, as in a lizard. Papillary distance was 12 cm. Eyeball motility, acuity of vision and eyegrounds were

normal. The nose was displaced to the right, and the left nostril was occluded. A pressure sore was observed over the left side of the nose. Upper dentition was distorted, and hard and soft palates were depressed markedly, leaving hardly any room for the tongue. Respiration was disturbed, and stertorous sounds were produced during sleep. The nasopharynx was occluded, and examination of the larynx was not feasible. Examination of the neck, chest, abdomen and extremities showed no pathological findings.

Fig. 3. A monstrous deformity resulting from fibrous dysplasia.

Laboratory studies: blood count and morphology, E.S.R. and urinanalysis were normal. The Kahn-Wassermann reaction was negative. Blood chemistry: urea, glucose, electrolytes, total proteins, albumin and globulin, cholesterol, calcium, phosphorus, potassium, alkaline phosphatase, as well as urinary excretion of calcium on a regular hospital diet, all were within the normal limits. I^{131} uptake in the thyroid gland was elevated (38 per cent after two hours and 60 per cent after 24 hours); urinary excretion was 27 per cent after 24 hours.

Radiological studies of the chest, the gastrointestinal and the urinary tracts revealed no pathology. X-ray examination of the skull showed a

well circumscribed amorphous mass the size of a fist replacing the normal structure in the midpart of the facial skeleton (see Figs. 4 and 5). The orbital roofs were pushed upward and thinned out. It appeared almost certain that the left maxilla was the only bone involved.

We decided to perform an extirpation of the diseased maxilla, hoping that when followed by a plasty, the patient's condition would become bearable. The operation was planned as follows:

1. Tracheotomy under local anesthesia (intubation was not feasible).

2. General anesthesia through an endotracheal tube.

3. Ligation of the left external carotid artery.

4. Excision of the badly nourished, thinned out skin over the left maxilla with preservation of as much cutis as deemed necessary for a lining of the resulting cavity.

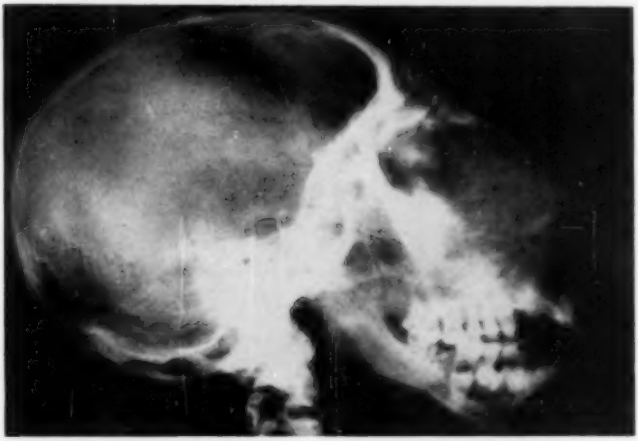

Fig. 4. Amorphous mass in the midpart of the facial skeleton.

5. Maxillectomy, total or partial.

6. Operation cavity to be lined with adjacent skin or with a skin graft.

7. The fate of the left eye to be decided at the end of the operation.

The operation did not proceed accordingly. The usual premedication exerted a marked depressive effect, patient's breathing became deep, slow and irregular and his complexion livid and cyanotic. An emergency tracheotomy was done and oxygen and blood were given. A mixture of nitrous oxide and oxygen was then administered through an endotracheal tube. The left external carotid artery was ligated.

The surgical approach was through a modified Moore's incision, simultaneously excising the sore and the adjacent atrophic skin. A thin bony shell was exposed and brisk bleeding from periostal vessels appeared. On removing the bony shell a huge cavity was opened and found to be

filled with blood and a soft spongy substance. Bleeding was uncontrollable, and tablespoons were used to evacuate the contents as rapidly as possible. After a few minutes the whitish bony wall of the cavity could be seen. Hot saline sponges were put in and this partly controlled the bleeding; however, the blood pressure dropped suddenly, and respiration and cardiac beat stopped. Artificial respiration, massive blood transfusion and intravenous nor-adrenaline were of no avail.

On postmortem examination a large cystic structure was found with a

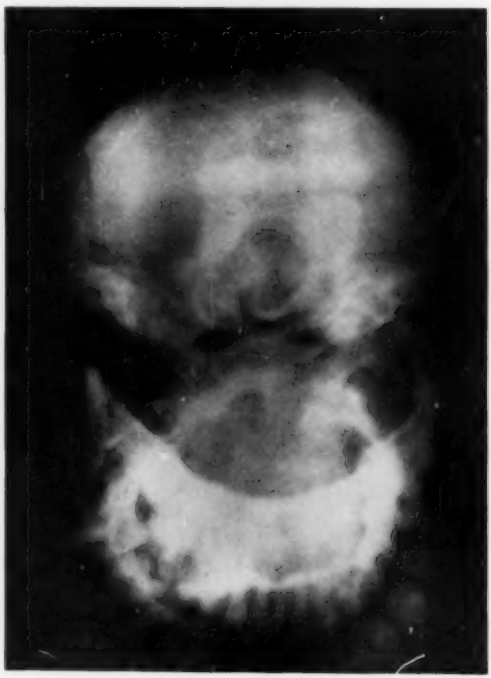

Fig. 5. Amorphous mass in the midpart of the facial skeleton.

bony wall, discrete from the surrounding bone (see Fig. 6). The cyst occupied a paracentral position, its center situated approximately where the left maxillary sinus should have been. The diameter of the cavity was about 10 cm. It displaced the paranasal sinuses and the nasopharynx, reaching posteriorly the bodies of the cervical vertebrae. The left orbital roof was displaced superiorly so that an impression was made in the inferior aspect of the left temporal lobe. In no place did the mass actually penetrate into the cranial cavity, but the floor of the anterior fossa was paper-thin in some places. The lungs were soft and airy. The

heart was drop-shaped and showed a few petechial hemorrhages in the auricular pericardium. The gastrointestinal tract, liver, gallbladder, bile ducts, spleen, pancreas, adrenals, kidneys, urinary passages and abdominal vessels were normal. There were no other bony deformities.

Microscopic examination showed areas of fibrous connective tissue with foci of newly-formed, primitive bone tubercula. Osteoblasts were seen in the vicinity of the primitive bone.

Fig. 6. Large cystic cavity displacing the surrounding structures.

COMMENT AND SUMMARY.

An unusual example of the monostotic form of fibrous dysplasia in a 25-year-old male is described. It involved the left maxilla, resulting in a monstrous external deformity. No other lesions were found in the body, and laboratory studies revealed normal values except for an elevated uptake of I^{131}. At operation respiratory depression and hemorrhage resulted in irreversible cardiac arrest.

Retrospectively it seems to have been a mistake to continue the operation after completing tracheotomy. The cause of

the respiratory depression should have been more carefully investigated and the intervention postponed or perhaps abandoned.

It appears plausible that deformities like the one described here served as inspiration for the mythological concept of a monster, as well as for some works of art by Hieronymus Bosch and by Pablo Picasso, among others.

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POSTGRADUATE COURSE.

The next postgraduate course in Laryngology and Bronchoesophagology to be given by the University of Illinois College of Medicine is scheduled for the period April 4 to 16, 1960. The course is under the direction of Dr. Paul H. Holinger.

Interested registrants will please write directly to the Department of Otolaryngology, University of Illinois College of Medicine, 1853 West Polk Street, Chicago 12, Ill.

A MODIFIED TECHNIQUE OF RHINOMETRY.

With a Preliminary Note on the Effect of Nasal Decongestants Administered Orally.*

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Determination of the size of the effective nasal airway has long presented a challenge to rhinologists. It presents a particular problem to modern rhinologists because of the popularity of decongestants for oral administration, which are now used without any real knowledge of the degree of their effect on the nasal mucosa.

Rhinometric methods previously used are open to the criticism that they frequently cause distortion of the size of the nares as well as reflex mucosal congestion. Indirect methods include measurements of the gross strength of the respiration through one or both nares, or an analysis of the shape and size of spots made by breathing on a mirror, as recommended by Zwaardemaker.[1] These methods have the advantage of simplicity but lack the accuracy of more direct methods, which include: *1.* Courtade's[2] water manometer, an appliance attached externally and unilaterally to the nares; *2.* the mask introduced by Reverchon and his associates,[3] to prevent deformity of the external nares in the course of the examination; *3.* the mask devised by Uddström[4] for the exact, separate measurements of the air flow through the nasal and oral compartments.

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None of these methods meets the obvious need for a technique of rhinometry which will be both accurate and practical in the evaluation of the effects of surgical measures and medications on the the nasal airway. We began our attempt to devise such a method by a careful review of the numerous procedures previously recommended for this purpose. We also bore in mind the principles of nasal permeability worked out by Uddströmer[4] and Proetz.[5] We agree with such observers as Stoksted and Nielsen,[6] and Seebohm and Hamilton[7]

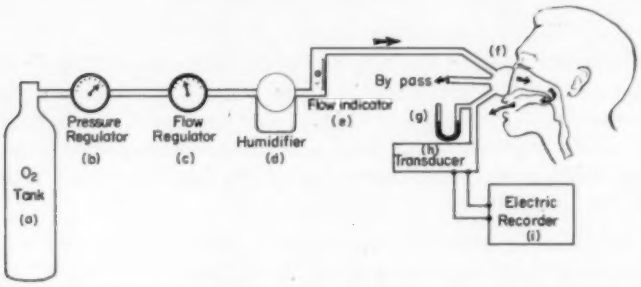

Fig. 1. Equipment for rhinometry: A.—Oxygen source at 10 liters per minute. B.—Pressure regulator (National cylinder style 6484. C.—Flow regular 0 - 15 liters per minute (National Cylinder Gas Model 211-1. D.—Humidifier (National Cylinder Gas Model 24703). E.—Flow meter (National Cylinder Gas Model 24980). F.—Nasal oxygen mask (Boothby-Lovelace-Bulbulian, manufactured by Linde Air Products Company) and improvised by-pass valve with lumen calibrated in centimeters H_2O. G.—Water Manometer (simple U-tube). H.—Strain gauge (Stathan No. P23B). I.—Electric recorder, Weston Model 6701, 1 millivolt calibrated in centimeters of water (the 10-inch scale equivalent to 10 cm. H_2O). The following should be noted on wiring diagram: Standardizing control (3000 ohm, 2 watt potentiometer); strain gauge control (3000 ohm, 2 watt potentiometer); 6 volt battery to energize strain gauge; 1.5 volt battery to standardize control.

that the electronic devices available in medicine today permit more convenient and more accurate objective measurements of the nasal airway than any of the devices previously utilized. We have found the pressure transducer (strain gauge) and the direct writing recorder especially useful.

DESCRIPTION OF TECHNIQUE.

The technique of anterior rhinometry which we employ is a modification of the posterior rhinometric technique devised by Seebohm and Hamilton.[7] By their method, a double-lumen

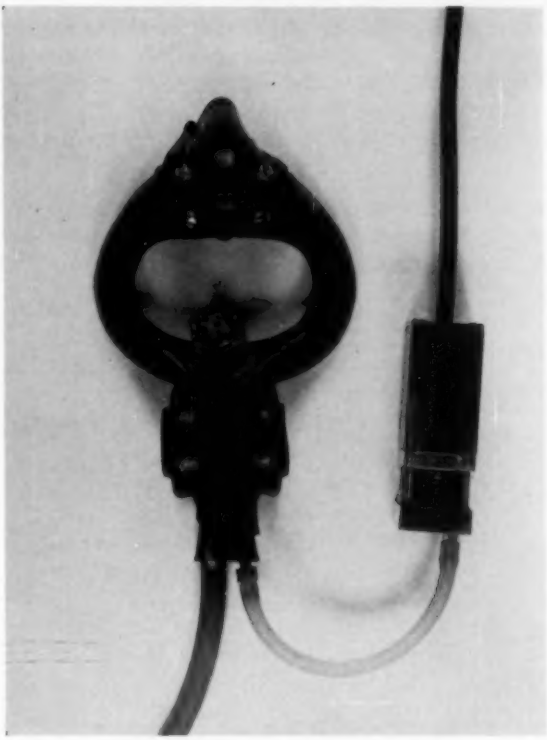

Fig. 2. Mask and transducer used in rhinometry.

tube is introduced into the mouth, and a measured flow of oxygen is passed into one tube. The oxygen flows on into the oropharynx, whence it can alternately pass: *1.* into the nasopharynx, or *2.* out of the by-pass oral tube to a transducer. The pressure measurement thus secured is a relative inverse index of the size of the nasal airway. This recording method involves feeding the electrical output of the transducer into an amplifier and direct writing recorder. In testing this method, we found an undesirable feature, that the mouthpiece used very frequently stimulates the gag reflex; therefore, we modified this method by replacing the mouthpiece with

the Boothby-Lovelace-Bulbulian nasal oxygen mask, to which a pressure transducer is connected. The mask is a satisfactory substitute for the mouthpiece, since we do not use intranasal topical applications. With this alteration, an efficient method of anterior rhinometry becomes available. The apparatus necessary is shown in Figs. 1 and 2, and the wiring diagram in Fig. 3.

Warm, humidified oxygen is fed into the mask at 10 liters per minute; it passes into the nose and nasopharynx and then out through the mouth. The fall in pressure within the

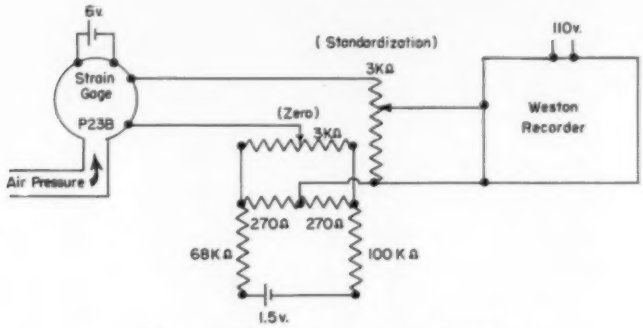

Fig. 3. Wiring diagram of equipment.

mask, and, therefore, within the nose, is transmitted to the pressure transducer connected to the mask. The output of the transducer is fed to the recorder, and the number obtained in millivolts is readily converted to centimeters of water pressure. The final value is the index of obstruction of the nasal airway.

EXPLANATION OF OPERATION.

Since air is a compressible fluid, the electrical analogue of the fluid system can be used for the explanation of this method (see Fig. 4).

The circuit which we employ is a constant current system; that is, it is a system in which, if the internal source voltage

and resistance remain constant, the current in the circuit also remains constant in spite of changes exterior to the source.

This is evident in Fig. 5, in which the current in the circuit is:

$$\text{I (Amps.)} = \frac{\text{Eb (volts)}}{\text{Rs plus Rn (ohms)}}.$$

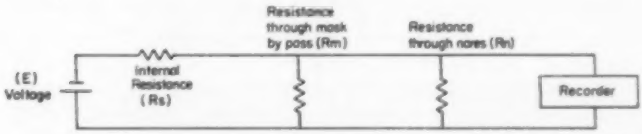

Fig. 4. Electrical analogue of Fig. 1.

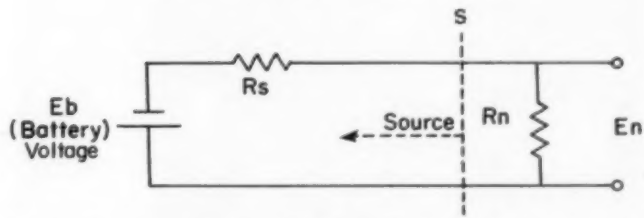

Fig. 5. Demonstration of voltage En as equal to Ik Rn. Rs—internal resistance; S—line dividing circuit from source; Rn—resistance equivalent to nares; En—pressure drop equivalent to drop in nares.

If Rs is very much greater than Rn, then Fig. 5 is reduced to:

$$\text{Ik (a constant)} = \frac{\text{Eb}}{\text{Rs}} \text{ (assuming Eb plus Rs are held constant).}$$

Our fluid analogy replaces Rs by an oxygen flow regulator; Rn by the nasal resistance to flow; and Eb by high pressure oxygen. It will be observed in Fig. 5 that the voltage En is equal to Ik Rn. Since this is true, any change in Rn will cause a change in En, which in analogy is a pressure drop from the mask to the nasopharynx. This pressure drop is transmitted to a strain gauge or pressure transducer, the output of which, when applied to the electric recorder, gives

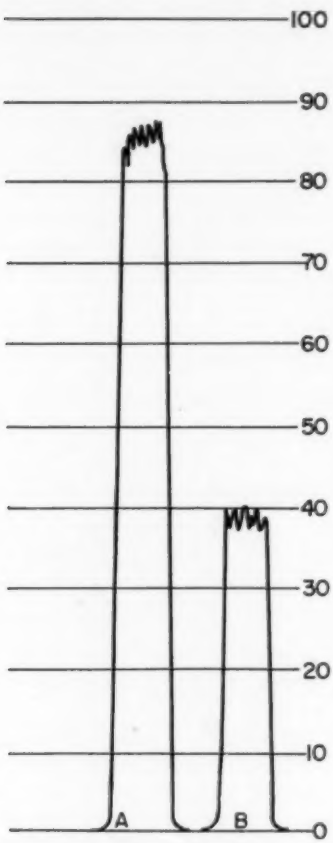

Fig. 6. Example of before and after recording. A represents 8.6 cms. of water pressure; B represents (3.8 cms. water) improved nasal airway.

a deflection (in millivolts) that represents nasal resistance (when converted to centimeters of water).

Because the fluid system is a non-linear device, the pressure obtained is also a non-linear function of the nares opening. Stoksted and Nielsen[6] have amply illustrated the factors involved in deriving the non-linear relationship. The system

which we are describing does not require the refinements necessary in their system, because of the method of measurement. Inspiration with the mouth closed would be analogous to another voltage source, the lungs, in series with a constant current source. It was, therefore, found simpler to have the patient close the glottis, if he could, or breathe gently through the mouth, neither of which actions would significantly complicate the nasal air-flow system. The resulting negative and positive pressure on quiet respiration through the mouth in

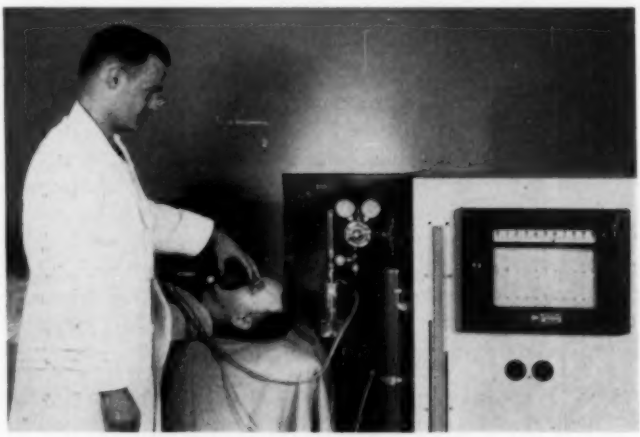

Fig. 7. Position of patient and operator during test.

patients unable to hold their breath produces no undulations at all, or a minimum too slight to need consideration. Any undulations from respiration shown on the graph (see Fig. 6) are averaged as a straight line, and the reading is taken accordingly.

A by-pass opening is necessary on the oxygen mask. If it is not provided when the nose is completely obstructed, the flow rate at the source would be altered, and the recorder would stop at full scale on the paper. The nasal mask used (see Fig. 2) has provisions for using any one of three dif-

ferent calibrated holes to allow the oxygen to by-pass a completely obstructed nose.

CLINICAL APPLICATION (SEE FIG. 7).

The patient, whether his nasal obstruction is of infectious, allergic, vasomotor, endocrine or psychic origin, lies recumbent for ten minutes before the test, so that he will be fully relaxed, and maximum passive mucosal congestion will occur. He is shown how to open his mouth and allow the oxygen from the nasopharynx to escape into the oropharynx as he breathes quietly through his mouth.

With the oxygen input shut off, the recorder is set with the strain gauge control at zero; this setting corresponds with the largest diameter of the nares. The flow regulator is turned on to 10 liters of oxygen per minute. The nasal outlet of the mask is obstructed, to stimulate a completely congested and obstructed nose; the oxygen in the mask must, therefore, escape through the by-pass valve. The standardization control is now adjusted until the recorder reads 1 mv., that is, full scale. As this takes place, a U water tube in parallel with the transducer air hose (see Fig. 1) will be noted to be 10 cm. in height, as the diameter of the by-pass orifice has been made to produce such a pressure.

During the tests to determine the effectiveness of whatever medication is used on a partly open nose, the physician closes the by-pass with his finger, thus causing all oxygen to pass through the nose. As the calibration of the recorder is known, and full scale on the recorder is equivalent to a given pressure in centimeters of water, any reading less than full scale is that ratio or percentage of full scale pressure calibration (see Fig. 6).

PRELIMINARY RESULTS.

To test the accuracy of the apparatus, ten patients, all presumably normal, were tested unilaterally, the other side of the nose being taped to simulate obstruction. Ten tests were conducted on each patient, and in all instances repeated trials on the same patient produced consistent readings.

To date, and preliminary to the study of a later, larger series of tests, we have investigated the effect on 12 patients, of each of four sympathomimetic agents commonly used in compounded pharmaceutical preparations (see Table I). A baseline reading was secured on each patient before the medications were given, always on an empty stomach, and a second reading was secured an hour later. At this time we are reporting only the gross objective and subjective results. In a later report, the variations in response will be presented. As Table I shows, the number of cases in which objective

TABLE I.

Objective (Rhinometric) and Subjective Results of Nasal Decongestants Administered Orally to 12 Patients.

Drugs	Rhinometric Objective Results Airway			Subjective Results		
	Increased	Decreased	Unchanged	Better	Worse	Same
Ephedrine (Ephedrine Sulfate)	9	1	2	5	3	4
Sudafed (Pseudoephedrine HCl)	4	5	3	2		10
Neosynephrine (Phenylephrine HCl)	10		2	6	1	5
Propadrine (Phenylpropanolamine HCl)	8	3	1	4	3	5
Total patients-tests	31	9	8	17	7	24

improvement occurred is considerably larger than the number in which the gross effects were great enough to impress the patient, though the figures are too small to be of any statistical significance.

COMMENT.

In addition to its simplicity of application, the technique described has been found to have a number of other advantages:

1. It provides a permanent record of the original state of the nasal airways and of the results of medical or surgical treatment.

2. The technique is an improvement over the method of which it is a modification, and in which a gag-stimulating air

stream is directed against the palate and oropharynx. Reflex closing of the naso-oropharyngeal communication is infrequent in the new technique. The oxygen in the nose can, therefore, escape through the nasopharynx and into the mouth, and a valid estimate of the nasal airway can be obtained on the recorder.

3. The 10-inch deflection of the recorder provides a sufficiently large scale for measuring the slightest changes in the caliber of the nasal passages.

4. Pulmonary influences are relatively unimportant.

5. This is a relatively inexpensive clinical test, which permits the testing of large numbers of patients in short periods of time. The nasal air mask input is tolerated by adults and by older children, many of whom were inconvenienced by the mouthpiece used in the original test and would not cooperate in it. Young children, of course, do not cooperate well in any test.

6. Reflex vascular changes are minimized by the use of warm humidified oxygen.

7. Since quiet respiration through the mouth does not alter the results, patients who have difficulty holding their breath while maintaining a relaxed soft palate can be permitted to breathe through the mouth.

SUMMARY.

A method of anterior rhinometry is described in which the improvement in the nasal airway can be conveniently measured before and after treatment with orally administered nasal decongestants. The method is simple to use, causes minimal discomfort to the patient, and provides a permanent record of changes in the airway before and after medication or surgery.

Preliminary tests show that the oral administration of nasal decongestants does increase the size of the nasal airway, although the effects may not be sufficient for the patient to realize it grossly.

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PAN-PACIFIC SURGICAL ASSOCIATION.

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Honolulu, Hawaii, September 27-October 5, 1960.

The Eighth Congress of the Pan-Pacific Surgical Association will be held in Honolulu, Hawaii, September 27 through October 5 in 1960.

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PROCEDURE OF "INTERPOSITION" FOR OTOSCLEROTIC DEAFNESS.

MICHEL PORTMANN, M.D.,

Bordeaux, France.

Surgery for deafness caused by ankylosis of the stapes has been steadily improving. Although procedures such as stapes mobilization, stapedectomy, and fenestration of the labyrinth, have been done since the end of the 19th Century, it is really due to chemotherapy and the antibiotics that these operations have been successful in recent years.

Sourdille[19] worked on the fenestration operation for many years and in 1927 was able to demonstrate patients operated upon successfully. Lempert[10] refined the procedure and described his one-stage operation. The extraordinary development of the operation, thanks to the American school, is well known.

Although fenestration of the posterior labyrinth may still be used as a palliative procedure, it is crude compared to the latest possibilities offered by surgery for deafness. The patient, after fenestration, is left with a cavity which needs constant cleaning and care. The ossicular chain is interrupted, the posterior labyrinth is opened, and the hearing cannot be expected ever to be normal again.

In 1952, Rosen[16] revived stapes mobilization, a procedure widely used in the 19th Century by the French school, particularly by Boucheron[3] in 1888, Miot[11] in 1890, and E. J. Moure[12] in 1890, and later discontinued because of the risk of infection. Since 1952, however, there have been innumerable publications throughout the world, dealing with thousands of cases attesting to the interest aroused by Rosen's publication.

Although stapes mobilization is a more physiological procedure than fenestration of the posterior labyrinth, it still is far from perfect. There are many cases in which the anky-

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losis is too far advanced to permit efficient mobilization. This difficulty has in the past been overcome by various procedures directed at the footplate, thereby avoiding fracture of the crura. For example, Goodhill[6] uses a vibrator; Heermann[8] small chisels and hammers designed to attack the sclerosed articular junction. In 1956, Portmann and Claverie[13] described a microdrill which has since been adopted by others,

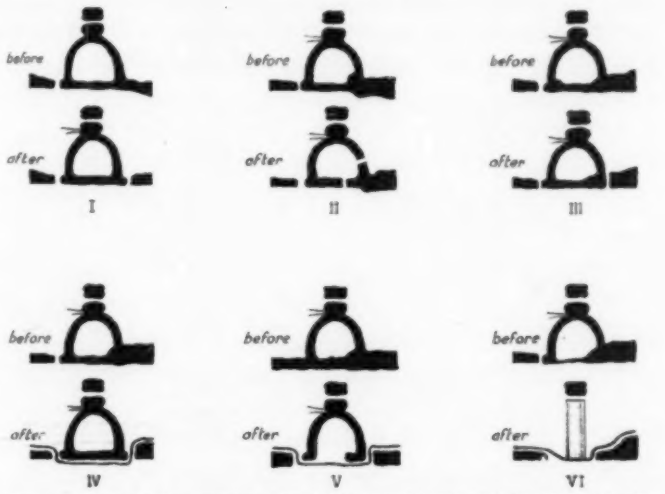

Fig. 1. Some stapes surgery procedures: I—Simple mobilization; II—Anterior crurotomy; III—Stapedo-vestibular osteotomy; IV—Interposition, Type I; V—Interposition, Type II; VI—Fenestration-graft and plastic stapes.

notably, John Shea Jr.[18] This instrument made possible a true stapedio-vestibular osteotomy, also called "stapedioclasy" by Fr. Antoli Candela.[1]

Fowler, Jr.,[5] in 1954, described his procedure of anterior crurotomy in which he separated the diseased anterior end of the footplate from the disease-free posterior part, which was mobilized. Many more techniques might be mentioned; none, however, can be considered the ideal for stapes surgery. The successful results of stapes mobilization by simple manipulation at the head or neck was about 35 per cent, whereas the

immediate success by newer techniques was quoted by various authors as being 50 per cent, 60 per cent, and even 80 per cent. Most of these authors acknowledge that after six months the number is greatly lessened, and after several years the success rate is 25 per cent. One might, indeed, logically suppose that manipulation around the footplate may stimulate bone growth and re-ankylosis. This was suggested in one case in which I had the opportunity of mobilizing the stapes three times when the patient refused fenestration. After the first operation, the excellent postoperative gain was lost in eight months; after the second, in three months, and after the third opera-

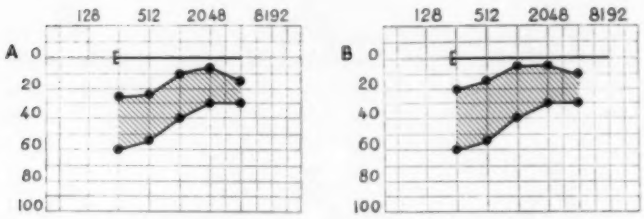

Fig. 2. Average of air-bone gap gain with interposition. O—bone level before operation; A—average of all successful cases: 95 per cent of all patients operated by interposition procedure; B—average of the best results: 75 per cent of all patients operated by interposition procedure.

tion I found the stapes completely fixed. It seemed that manipulation stimulated further fixation on each occasion.

The frequency of refixation after mobilization led to other procedures which were more harmful to the labyrinth. Kessel,[9] in 1877, recommended stapedectomy, and Cornelli,[4] in 1949, did the same operation in a larger number of patients. Rosen[17] more recently has advocated making a small fenestra in the footplate when he has failed to mobilize it; and others, *i.e.*, H. Guillon,[7] do a wider "platinotomie." None of these procedures, however, seems logical, because first, there is no columellar effect; second, the fenestra thus made tends to close rapidly; third, there is always risk of infection and labyrinthitis while the fenestra is open.

It was to avoid this risk of infection that led M. Pruvot[15]

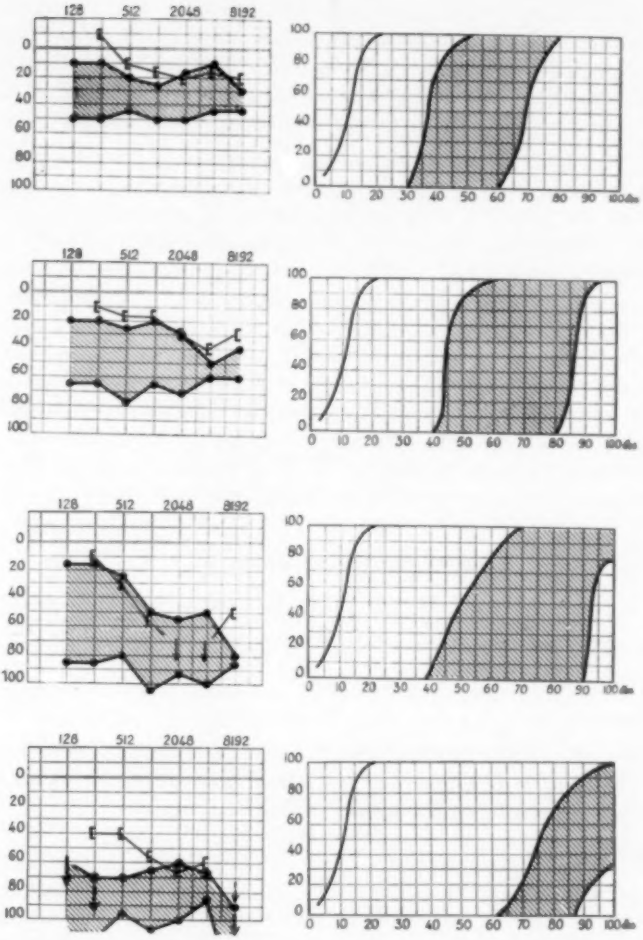

Fig. 3. Some cases of interposition results after one year. On the left, tonal test; on the right, speech test. From up to down: different types of troubles: III, II, IV, IV.

to suggest closing the oval window with a mucus membrane graft. Shea,[13] after removing the stapes, uses a vein graft to cover the oval window and re-establishes a columella effect by using a polyethylene tube, in one end of which the lenticular process of the incus is inserted, while the other end, cut to a point, is placed on the graft over the oval window.

Although his procedure seems logical, and his results are excellent, it seemed to us a pity to use a prosthesis of plastic when the patient's own stapes could more rationally be used. We,[14] therefore, described a procedure (1957) which we called "interposition" which seems to us to be the most physiological surgical procedure at the present time. The objectives of the operation are: *1.* To isolate the stapes, or part of it, from the edge of the oval window; *2.* To insert a graft between the free stapes or a portion of it, and the oval window. The graft has two aims: first, to close the vestibule and protect it from possible infection; second, to interpose tissue between the bony frame of the oval window and the bony footplate, and thus prevent the ankylosis.

STAPEDIO-VESTIBULAR INTERPOSITION.

As this operation has been described in previous articles we shall here mention only a few particular points of technique.

Approach.

This is almost always the transmeatal approach described by Rosen. It is important to remove enough of the canal to obtain a complete view of the stapedial footplate.

Examination of the Lesions.

It is necessary to analyze the lesions causing ankylosis in order to judge what might be accomplished surgically and to estimate the possibility of preserving the stapes. Lesions are classified into four fundamental types (Bellucci[2]):

Type I: The joint space is still visible, but the annular ligament is beginning to ossify in places, mostly in its anterior-superior part.

Type II: The otosclerotic surface has overgrown the anterior-superior part of the joint space and is already in the footplate. In Types II and III a compensating atrophy of the remainder of the footplate may be seen. This appears bluish and transparent. The crura may be involved by otosclerosis, or on the other hand, may be atrophic.

Type IV: The whole footplate is involved by otosclerotic change and is completely fixed and thickened.

Types I and II may respond to a simple mobilization procedure, and there were none of these types in the 135 cases reported here.*

Materials for Interposition.

Various materials have been tried, such as animal membrane, sheets of polyvinyl, conjunctiva, aponeurosis, bucal mucous membrane, and vein. The last seems to be the best suited for the purpose. The operation, described fully elsewhere, consists of (a) disarticulation of the incudostapedio joint; (b) removal of the mucosa around the oval window; (c) careful hemostasis; (d) ablation of the stapes from the window; (e) insertion of the graft and repositioning of the stapes under the incus and on the graft.

Results.

One-hundred-thirty-five cases were done by this method. Of these, 96 have excellent results, *i.e.*, almost complete closure of the air-bone gap and even improvement of bone conduction. Thirty-two have a good result, *i.e.*, an improvement of 10 to 30 decibels but without close of the air-bone gap. Seven have no improvement.

Lesions.

Of the 96 excellent results:
22 were Type II.
10 were Type II/III.
13 were Type III.
20 were Type II/IV.

*Types I/IV or II/IV resemble Type I or II, but with complete fixation of the remaining footplate.

10 were Type III/IV.
21 were Type IV.

Of the 32 good results:

6 were Type II.
4 were Type III.
7 were Type I/IV.
5 were Type III/IV.
10 were Type IV.

Thus, of 135 cases in which postoperative audiograms were obtained more than three months later, there were 128 (94.8 per cent) good or excellent results. Of these, 73 cases had complete fixation of the footplate and were not amenable to simple mobilization.

Audiometric Types According to Shambaugh's Classification:

Of the 96 excellent results, that is nearly total closures of the air bone gap, we note that:

18 cases were Shambaugh Type I.
50 cases were Type II.
20 cases were Type III.
13 cases were Type IV.

Shambaugh's Type I case is favorable to fenestration of the semi-circular canal, Shambaugh's Type III has very little chance of success from fenestration according to his classification, and Type IV cases are not suitable for fenestration.

Of the 32 good results:

4 cases fell into Shambaugh's Type I.
14 cases fell into Shambaugh's Type II.
10 were Shambaugh's Type III.
4 were Shambaugh's Type IV.

This makes a total of 17 cases Type I. 66 cases Type II, 30 cases Type III, and 17 cases of Type IV.

We feel, therefore, that interposition is already a procedure worthy of further research. In cases not suitable for fenestration and in which simple mobilization is likely to be completely

unsuccessful, it may give a result in which the air-bone gap is completely closed. In cases with good bone conduction it may allow the patient to recover absolutely normal hearing, even in the face of complete fixation of the footplate.

We realize that this series of cases is too small to be completely significant, and too recently done. Five or six years must lapse before we can say anything definite about results; however, we believe that research should continue along the lines of stapes surgery, the interposition being only one aspect of the problem, and possibly only one stage of it.

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ANNOUNCEMENT.

The Annual Spring Meeting of the Alumni Association of the New York Eye and Ear Infirmary will take place April 4-7, 1960.

The meeting will be oriented towards pediatric otolaryngology. Symposia will be offered on: Nystagmus as a Pediatric Problem; Diagnosis and Rehabilitation of Hearing Problems in Children; and Ankylosis of the Stapes. There will also be a closed circuit television demonstration of surgical procedures. In addition, courses will be offered in: Allergy and Immunology in Children; X-ray Diagnosis in Ear and Sinus Problems in Children; Pediatric Laryngeal Problems, and Secretory Otitis Media in Children.

Additional information may be obtained by writing to Dr. John R. Finlay, Secretary, Alumni Association, 218 Second avenue, New York 3, N. Y.

METHODS OF SHRINKING THE INFERIOR TURBINATES TO IMPROVE THE AIRWAY.*

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Montreal, Canada.

One of the commonest complaints with which the otolaryngologist has to deal is chronic rhinitis with nasal obstruction. Perhaps this is not surprising when we consider the abuse to which the nasal mucosa is exposed. Repeated acute and chronic infections, allergy and endocrine disturbances all tend to engorge and often hypertrophy the mucous membrane, especially over the inferior turbinates. The inhalation of dust, smoke, and exhaust fumes, as well as the lack of humidity in dwellings during the winter months, act as irritants to certain persons. Changeable temperatures in the Spring and Fall with extremes of heat and cold also play their part.

In improving the airway through the nose the normal air currents should be considered. These have been described by various authors since the end of the last Century, but there is still some controversy as to the definite pathways. According to Proetz, "their pattern is determined by three structural elements; the direction of the anterior naris, the essential configuration of the nasal chamber and the relative sizes of the anterior and posterior nares."[1]

In the average Caucasian nose with a slit-like horizontal opening at the anterior naris, the inspired air arches high up into the nose in a parabolic curve before descending into the larger opening in the nasopharynx. This arrangement does not apply to the same extent in the Negro. In the widely dilated and more circular nostrils of the Negro, the inspired air takes a more direct transverse course over the inferior turbinates. This was thought by Thomson and Buxton[2] to be more suitable in a hot, moist climate where

*Presented at the combined British and Canadian Medical Association meeting, Edinburgh, Scotland, July 20, 1959.

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humidification was less important and there was little or no hindrance to the inspired air. In contrast, the transverse elliptical opening of the North American and Esquimo directs the air upward over a larger area. This is a more efficient mechanism for warming and moistening the air and more suitable for those in a colder climate.

This can easily be demonstrated by means of a sagittal section of a human head fixed in a shallow square box showing the three turbinates, the septum being replaced by a piece of window glass. About a foot of rubber tubing is fitted into the nostril and a cigarette placed in the open end of the tube. Another tube about double the size representing the trachea, is fitted into the nasopharynx. The glass and rubber tubes are hermetically sealed so that the smoke cannot escape. A plaster model in place of an actual head is a suitable substitute. On lighting the cigarette and breathing smoke through the specimen one can see, in a normal nose without any marked obvious obstruction, how the inspired air arches high up anteriorly before reaching the nasopharynx.

Although most of the air is directed upward when the opening in the anterior naris is horizontal, some of the inspired air curves over the inferior turbinate, where it is warmed and moistened by the cavernous tissue before entering the lungs.

If a model is used with a rubber or latex external nose which can be manipulated, the direction of the air currents can be changed. By tilting the nostril upward, as one does in using a nasal speculum and dilating it with a larger round rubber tubing, the cigarette smoke tends to pass over the inferior turbinate in a similar pattern to that seen in the Negro.

This agrees with the suggestion of Van Dishoek,[3] who considered that the inspired air in man was not influenced by the turbinates but took the path of least resistance.

In his most recent and fascinating book, Negus[4] graphically showed air currents through the nose in various mammals. He quoted these lines which John Hunter wrote nearly a hundred years ago:

"Quadrupeds seldom breathe through their mouths, almost always through their noses, so that it may be said they are always on the scent; for the nose seems to make up for the deficiency of the eye, and they chiefly receive information by the nose. For this purpose, too, the nose is more free from

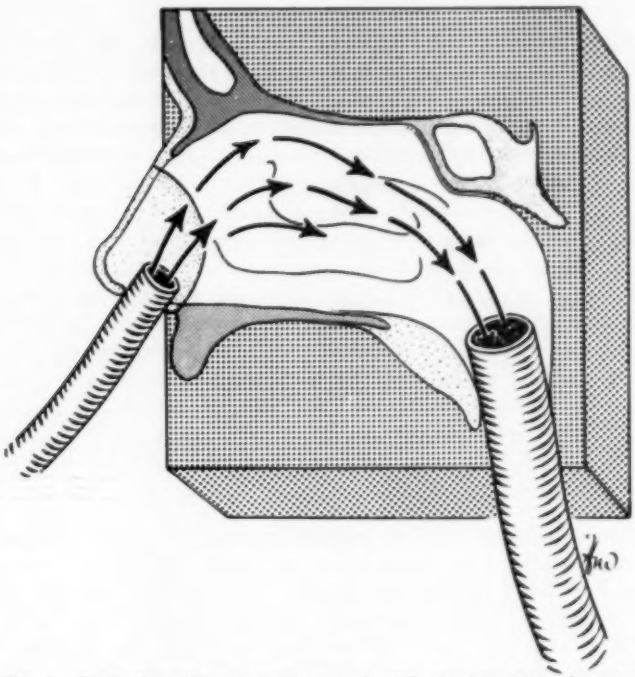

Fig. 1. Sagittal section of skull covered with glass to show the normal inspiratory air currents.

mucus in other animals than the human, so that the glands are not so numerous. I believe that herbivorous animals always breathe through the nose, and this constancy fits the nose better for choosing the food."[3]

In general it might be said that long-nosed animals, such as deer or antelopes, have a keener sense of smell than those with

shorter noses, as for instance monkeys and chimpanzees. In the former the inspired air is directed upward to the olfactory area and warns the animal of impending danger, whereas in the latter the main air current is through the lower half of the nose below the olfactory area. As a result, animals with relatively short noses depend more on sight than on smell, and this applies also to man.

From a clinical point of view, air currents through the nose in humans assume great importance. Although in general, inspired air curves high up in the nose as mentioned, currents also traverse the lower half as well. This can frequently be demonstrated in patients who complain of chronic nasal obstruction. Every rhinologist has had the experience of improving the airway temporarily in patients with chronic nasal obstruction by simply touching the anterior end of each inferior turbinate with 5 per cent cocaine. Occasionally patients also complain of partial blockage of the nose after a deflected septum has been corrected by a submucous resection. From the rhinologist's point of view the operation was successful, as the septal obstruction was all removed, but sometimes the patient is disappointed with the result. If the inferior turbinates were treated at the same time in well selected cases the result would often mean the difference between success and failure.

Assuming there is no redundant tissue to be removed, various agents have been tried to shrink the mucous membrane of the inferior turbinates. The electric cautery, silver nitrate, trichloracetic acid, phenol,[6] fuming nitric acid,[7] chromic acid, etc., have all been used to streak the turbinates and cause shrinkage.

In recent years, submucous injections of sclerosing agents such as sodium morrhuate or sodium psylliate have been employed on the assumption that they contract the mucosa of the turbinates without injuring the cilia on the surface.[8] Submucous electrocoagulation[9] has also been favored by many, as it destroys some of the large cavernous spaces and has the advantage over galvanic cauterization, because there is little or no crusting and a minimum of reaction.

The success of these methods of treatment depends upon the proper selection of patients, being most beneficial in those who have no allergic background but have a chronic swelling of the mucous membrane of the inferior turbinates, which shrinks well under the action of vasoconstrictors.

If there are fixed tissue changes of the turbinates which are irreversible, these structures will not respond to conservative measures. This applies also to the posterior tips of the inferior turbinates. If they do not shrink with cocaine or adrenaline, they can be removed with an electrocoagulation snare, or the electrocoagulation needle can be applied[10] in the usual manner, thus avoiding the danger of severe bleeding.

When the inferior turbinate bone itself is hypertrophied none of these measures is entirely successful. From the foregoing it is apparent that there are a great many patients with vasomotor rhinitis or chronic enlargement of the inferior turbinates who have no evidence of sinusitis, and are not benefited by antiallergic therapy. Many of these have tried medical or other conservative forms of treatment to no avail and still seek relief from their persistent nasal obstruction. Submucous resection of the inferior turbinates in these cases seems to offer the best chance of a permanent result.

A number of incisions have been described by various authors to remove the anterior enlarged third of the bone.

In 1930, Odeneal[11] recommended submucous resection of the middle turbinate to improve the airway, in cases of marked hypertrophy. Without going into detail in his short article, he stated: "It is a simple procedure, by means of a sharp elevator, to separate the mucous membrane and submucous tissues from the underlying bone and remove as much of the bone as is desired, afterwards replacing the flap in position and holding it there for 24 hours by means of a petrolatum-soaked pledget of cotton. It will be found necessary to clip off a small portion of the flap before replacing it in position, as there will be a certain amount of redundant tissue. The incision is made along the inferior external border of the turbinate, and the dissection carried out internally; it is not

necessary to separate it externally as this bone is always left." He concluded by saying, "I have never been called on to reduce the inferior turbinate in this manner, but I do not see why this cannot be done just as easily when indicated."

A few years later (1936) Harris[12] reported an "improved" technique for submucous turbinectomy of the inferior turbinate bone. Without illustrations of any kind he said: "Under local anesthesia I make an elliptical incision over the most prominent area of the inferior turbinate and resect this portion of the mucous membrane . . . . . As much of the bone

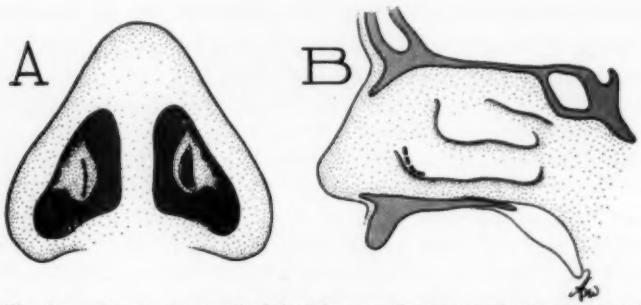

Fig. 2-a. Shows the vertical incision on the left and the exposed inferior turbinate on the right after elevating the mucous membrane.
Fig. 2-b. The dotted line indicates the incision on the right inferior turbinate bone.

is then excised under direct vision as is necessary." He concluded by saying he had done this operation in three cases with marked improvement in the "breathing space."

According to House,[13] "Submucous resection of the anterior portion of the inferior turbinal bone is of most value in perennial nasal obstruction due to turbinal enlargement, either unilateral or bilateral, which cannot be satisfactorily controlled by more conservative general management. Included in this group are vasomotor rhinitis, allergic rhinitis, compensatory unilateral hypertrophy secondary to septal deviation, and irreversible hypertrophy secondary to prolonged irritation. This underlying irritation may be due to infection, occupational environment, excessive smoking, etc." He stated

that it was not a new procedure and that Yankhauer had advocated it in his student lectures but had left no published reports on the subject.

A vertical incision is made over the anterior inferior leading edge of the turbinate. He stressed the fact that the anterior portion of the inferior turbinate bone has a rough, pitted surface, and as a result the mucoperiosteum cannot be readily elevated with a blunt septal instrument. A right and left angulated Freer knife is useful in separating the periosteum by sharp dissection from the surfaces of the bone. The mucoperiosteum is lifted from both the lateral and medial surfaces of the inferior turbinate bone for a distance of about 1.5 cm. Any fibers that are adherent are cut away by means of small turbinotomy scissors. The anterior third of the bone is grasped with Takahashi forceps rotated gently until it is fractured and then carefully removed without tearing the mucous membrane. Usually the posterior two-thirds of the bone is very thin and can be left in place after pressing it to the lateral wall. Sutures are unnecessary, as the edges of the incision fall together and are held in place by finger cots.

For a number of years Furstenberg[14] has been performing this operation and has been very enthusiastic about the results. He does not agree with the statement that the thicker the inferior turbinate bone itself the better the result. Some authors have suggested that when the bone is thick the result after submucous resection is good, but if the bone is thin and the mucous membrane hypertrophied, the result is not likely to be beneficial. In his opinion he has had equal success with thin bones as well as very thick ones. He does "not believe that the thickness of the osseous structure of the turbinate plays any very significant part in the prognosis." His approach is somewhat different. He begins by making two or three injections of 1 per cent procaine with adrenalin into the inferior turbinate starting posteriorly and coming forward. This assures satisfactory anesthesia. He then makes a deep horizontal incision commencing "about two centimeters anterior to the posterior end of the inferior turbinate." In this way he avoids the "rather profuse blood supply which comes in from the posterior end of the turbinate. The in-

cision is then made forward to the extreme anterior end of the inferior turbinate." The mucous membrane is separated from the bone by means of a submucous elevator. The flap is first lifted upward and then the lower flap is dissected downward until the free margin of the anterior part of the osseous structure is identified. The bone anteriorly and in-

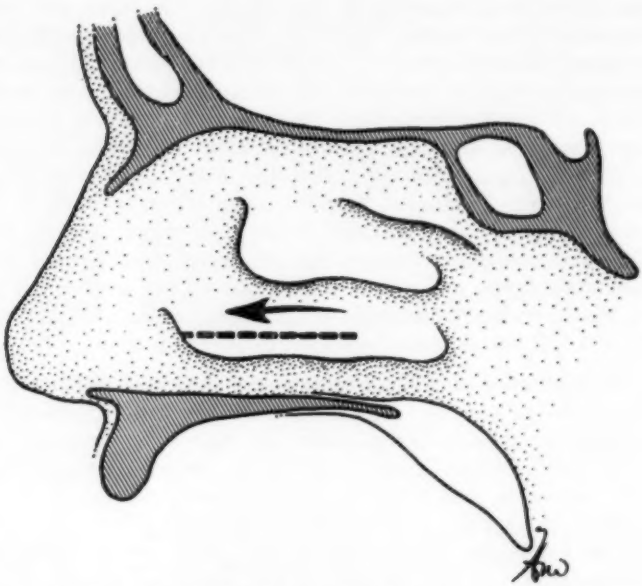

Fig. 3. The horizontal dotted line indicates the incision. It is about 6 mm. above the lower edge of the inferior turbinate bone.

feriorly is removed by means of a narrow, blunt-ended biting forceps. All of the osseous portion is carefully taken away. Then gauze vaseline covered packs are inserted and left for 48 hours. One is placed under the inferior turbinate and one above to bring the flaps together. Two other packs are usually used on each side and sedation given to relieve the discomfort. "By carefully packing the nose in this manner, one finds later only a small line of scar bisecting the turbinate in its

anterior-posterior plane with a little dimpling along this line, due to fibrous connective tissue contraction. In no way is the physiologic function of the inferior turbinate jeopardized when this is accomplished."

I have quoted freely from notes given me recently by Dr. Furstenberg. In his hands the results are very successful with permanent improvement in the breathing; however, besides this method, the technique I have used when indicated is very similar to that described by Yankhauer and House with a few modifications. In most cases it is done in conjunction with a septal resection when this is found necessary. After the usual premedication, absorbent dipped in pontocaine is applied to the inferior turbinates. This does not constrict the vessels or blanch the mucous membrane. Two injections of 1 per cent procaine with adrenaline are made into each turbinate beginning posteriorly and coming forward. Another injection is made into the anterior prominent portion and one above at the attachment of the turbinate. This balloons up the tissue and makes separation from the bone easier as well as helping to control the bleeding.

A semicircular incision is made with a septal or No. 15 Bard Parker knife on a long handle, starting above on the lateral wall at the attachment of the turbinate and curving downward over the anterior tip. The incision is carried through the mucosa and periosteum to the bone. The angulated Freer knife is used to cut the adherent fibers of periosteum first on the lateral and then on the medial side of the bone. If the slit-like opening in the head of the turbinate is too small and the vision restricted, the incision can be extended downward along the lower edge. Once the denuded bone is exposed it is not difficult to remove the hypertrophied anterior third or half by means of a Jansen-Middleton biting forceps. In most cases this is all that is required, as the turbinate usually tapers off and becomes smaller posteriorly unless the posterior tips are enlarged. The biting forceps removes the bone cleanly and lessens the danger of tearing the mucous membrane.

When the hypertrophied portion is removed the edges of

the incision fall together and heal without the necessity of sutures. As a rule it is helpful to fracture the remaining posterior one-third of the turbinate toward the lateral wall by means of a long-bladed nasal speculum or a septal elevator. Every millimeter gained in this way improves the nasal airway. A finger cot lightly packed with folded ¼-inch gauze

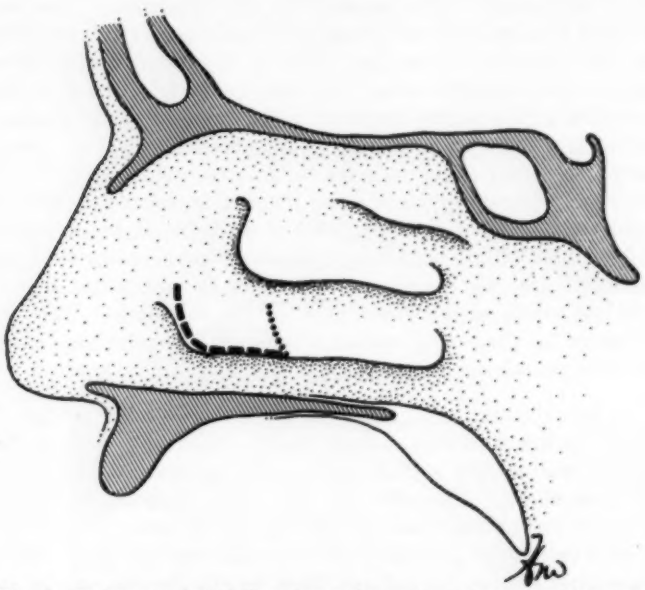

Fig. 4. The heavy dotted line shows the incision beginning high up at the attachment of the inferior turbinate and extending down along the lower edge. This gives a wider exposure. The dotted line posteriorly marks the line of incision when only part of the anterior portion of the inferior turbinate is to be removed.

and covered with vaseline is placed between each inferior turbinate and the septum. These are removed in 48 hours. There is very little bleeding, and the discomfort is similar to that experienced after a resection of the nasal septum. When shrinking occurs and the incision well healed, there is little or no scar.

Within a few weeks the inferior turbinate is smaller and

thinner as the supporting bony structure has been removed. This, of course, gives permanent improvement even in patients with allergy of unknown origin. As the naso-lacrimal duct is not disturbed tearing is not a problem.

Although no disagreeable postoperative results have been noted, such as atrophy or crusting, some might object to the fact that all the supporting structure anteriorly has been removed. If it is deemed necessary to leave part of the inferior turbinate bone, this is a simple procedure.

The semicircular or bowed incision is carried down over the anterior tip and along the inferior edge for a distance of about 2 centimeters. A second parallel incision to the bone about 2 centimeters posteriorly extends from above at the attachment of the turbinate down to meet the first incision at the lower edge of the turbinate. The mucous membrane is elevated from below upward very much like the flap of an envelope. When the bone is exposed, as much is removed as is necessary to improve the airway, by means of a Freer gouge and mallet. The flap is then replaced and held in position with a vaseline-covered finger cot.

Many patients operated upon in this manner have been observed over a period of years. None has shown any untoward results. Clinically the incisions have all healed by first intention, as there has been no loss of mucosal tissue. From the functional point of view the drainage of mucus is still downward and backward as the normal ciliary streams have not been disturbed.

Although the airway is greatly improved and the patients in general are enthusiastic about the results, occasionally one is disappointed. This is more likely to occur in children about the age of puberty. In view of this it would seem wiser to delay the operation until the age of 17 or 18.

In conclusion, the relief of nasal obstruction following this combined type of operation (septal resection and submucous resection of the inferior turbinates) is dramatic in the vast majority of cases. When indicated, the results are far superior to those obtained when the septum alone is corrected.

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THE UNIVERSITY OF MICHIGAN MEDICAL CENTER.

The annual Otolaryngology Conference at The University of Michigan will be held April 21, 22, and 23, 1960, under the direction of Dr. James H. Maxwell, Chairman of the Department of Otolaryngology.

Applications may be addressed to the Department of Postgraduate Medicine, University Hospital, Ann Abor, Mich.

AGENESIS OF THE LUNG.*

Report of a Case.

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Baltimore, Md.

Agenesis of the lung is not a common condition. The first case was reported by Haberlein[1] in 1787. The number of the authentic cases is about 150 at present and most of them were discovered at autopsy. In the series reviewed by Hochberg and Nachlerio[2] in 1955 (100 cases), the diagnosis was made during life in 27 per cent of the cases. The incidence of this anomaly's discovery during life has increased during recent years.

The etiology is unknown. Schwalbe[3] states that the condition is due to a developmental error of endogenous origin, and that this maldevelopment is the result of a faulty germ plasm. Ferguson and Neuhauser[4] explain the genesis of this condition on the basis of a defect in the germ plasm. Gruenfeld and Gray[5] feel that "developmental anomaly of the lung is favored by the phylogenetic newness of this organ and the enormous growth it must undergo in the embryo before its functional form is achieved." Oyamada, et al.,[6] emphasize the importance of the history of rubella during the first trimester.

Schneider[7] classifies the deficiencies of the lung into three groups depending upon the development of the bronchus and lung tissue. In type I, one lung is absent. In type II, the bronchus ends in a blind pouch, and there is a complete absence of lung tissue. In type III, the bronchus is poorly developed and ends in rudimentary lung tissue. This classification is of no particular value; has no answer to the question of embryology, nor has it any influence on the prognosis or diagnosis. It is even questionable whether type III can be called *agenesis* instead of *hypoplasia*.

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Sixty per cent of the patients have other developmental defects with pulmonary agenesis. The incidence of associated cardiovascular anomalies is 25 per cent.[8] Wexels[9] lists some of the associated anomalies with this condition as: patent ductus arteriosus, patent foramen ovale, atresia of bowels, atresia ani, atresia of esophagus, ventricular defect, horseshoe kidney, hare lip, cleft palate, malformations of vertebrae, absence of radius, spina bifida, accessory thumb, pulmonary vein entering the azygos vein. Wilson's[10] case had a unilateral mandibular dysostosis with agenesis of the lung. In our case a rudimentary right thumb was present, and also hydramnios was noted at delivery. An anomalous course of the great vessels like the pulmonary artery or the aorta, could be responsible for respiratory difficulty and even cause death due to the compression of the trachea, as in the case reported by Maier and Gould.[11] This is unusual, but apparently did occur in this case. The usual cause of death in case of vascular compression is strain and ultimately heart failure, if it is arterial, or congestion of the head and neck and selected viscera if it involves the veins. Morbidity and mortality depend more upon distortion of the airways than of the vascular channels.[8] Supernumerary lobe in the unaffected lung may be an associated finding with pulmonary agenesis, as in the case reported by Lelong, et al.[12]

The symptoms are variable, or the patient may be completely asymptomatic. Dyspnea, cyanosis and tachycardia are the symptoms encountered in the younger age group. The dyspnea is mild, intermittent and related to activity. Cyanosis and tachycardia do occur when this condition is aggravated by upper respiratory infection. Few cases have wheezing and stridor.

The clinical diagnosis is suspected on the basis of the physical and X-ray findings. Absence of breath sounds, dullness of percussion, and diminished respiratory excursion are frequent findings; however, the breath sounds could be transmitted from the remaining lung. This is best heard at the apex. The chest, as a rule, is symmetrical in infants, but lag is uniformly present on the affected side. As the child grows older there might be some asymmetry of the chest with

Fig. 1. The right side of chest shows a homogenous density. The trachea, heart, and mediastinum are displaced to the right.

flattening of the involved side. If the right lung is missing, the neart sounds will be found on the right side simulating dextrocardia.

The characteristic X-ray findings are dense, homogenous shadow with elevation of the diaphragm and narrowing of the intercostal spaces on the affected side. There is a displacement of the trachea, heart and mediastinum to the involved side. It is difficult sometimes to outline the heart shadow. The remaining lung may pass the midline.

Hurwitz and Stephens[13] claim priority for advocating bronchoscopy as a rational method for clinical diagnosis. Ferguson and Neuhauser,[4] reporting the first comparatively larger series of congenital anomalies of the lung where the diagnosis was made during life, emphasize the importance of the bronchogram. Ingram, Hudson, and Davis[14] advocate

Fig. 2. Barium swallow reveals the displacement of the esophagus toward the side of the affected lung.

first angiocardiography for demonstration of anomalous pulmonary circulation. Angiocardiography reveals the absence or rudimentary development of the blood supply to the affected lung and, at the same time, reveals congenital malformations of the heart and possibly the kidney. The three last mentioned diagnostic procedures should be undertaken

after due clinical consideration of each individual case; however, bronchoscopy without anesthesia is now an accepted diagnostic procedure in unusual respiratory conditions in infants.

Agenesis of the lung is compatible with life. In Hochberg and Nachlerio's[2] series, 27 per cent of the 96 were known to have lived to ages between 15 and 72 years. According to the literature this anomaly occurs more commonly in males, and is noted more often on the left side. The prognosis de-

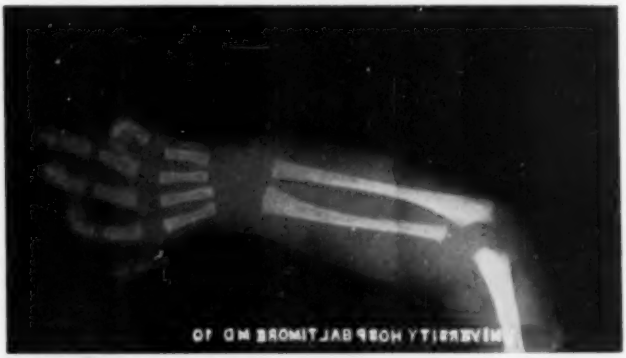

Fig. 3. X-ray from the hands shows the hypoplasia of the first metacarpal bone on the right hand.

pends upon the associated anomalies and also upon which lung is absent. Prognosis is considerably better with agenesis of the left than of the right lung. Statistics in the ten-year-old age group show a 58 per cent survival when the left side is affected, compared with 30 per cent when the right side is involved.[8] The greater shift of the trachea, the main stem bronchus and the great vessels is responsible for the difference in mortality. Schaffer and Rider[8] suggested the introduction of some non-absorbable and non-irritating material into the affected hemithorax to prevent the mediastinal shift. I was unable to find any reference in the literature that this has ever been carried out.

The lack of surgical approach might lie in the fact that

most surgeons believe that the patient with pulmonary agenesis dies of cardiac failure rather than from the effects of the agenesis. In the series reviewed by Oyamada, et al.,[6] associated cardiac defects were discovered in only one-fourth of the cases. This gives rise to the thought that a certain per cent of the patients might benefit from some type of surgical procedure, which would prevent the mediastinal shift and the consequent distortion of the tracheobronchial tree and the great vessels. It is a known fact that the morbidity and the mortality is higher when the right lung is missing and the distortion is relatively greater.

REPORT OF A CASE.

A girl, aged seven weeks, was born at University Hospital on August 1, 1959, two weeks before term. The mother, bigravida and bipara with one normal living child, was in good health throughout the pregnancy. When the membranes ruptured, a large amount of fluid was obtained, and the diagnosis of hydramnios was made. The premature female child was delivered by breech extraction with Piper forceps to the aftercoming head. The baby needed resuscitation but picked up rapidly. She weighed 2291 grams.

The child did not show respiratory distress on the following days, but on routine examination dullness was found at the right side of the chest. The breath sounds were heard well in the apex and front of the chest, but they were poorly heard posteriorly, mostly over the lower part of the chest. The heart sounds were best heard over the right hemithorax. X-ray of the chest revealed a homogenous density over the right hemithorax. The mediastinum and the heart shadow were displaced to this density. The heart could not be outlined. On physical examination a rudimentary right thumb was also noted. X-ray of the hands revealed hypoplasia of the first metacarpal bone on the right hand. Suction through endotrachial catheter was performed, but the X-ray failed to show any change in the previously reported density of the right hemithorax. Barium swallow did not reveal intrinsic abnormalities in the esophagus. There was a moderate shift of the esophagus to the right along the entire mediastinum. The child did well, had normal temperature, no respiratory distress, and gained weight at a normal rate. The patient was stabilized, and the clinical and the X-ray findings strongly supported the diagnosis of pulmonary agenesis. She was discharged from the hospital in good condition at the end of the second week. She was brought back to the Otolaryngology Department four weeks later for bronchoscopy to confirm the clinical diagnosis. The bronchoscopy revealed the larynx, trachea, and left bronchial tree to be normal. The trachea was continuous with the left main bronchus without evidence of the carina or opening of the right main bronchus.

SUMMARY.

A case of agenesis of the right lung, in a seven-week-old female infant is reported. The associated findings were

hypoplasia of the first metacarpal bone on the right hand and hydramnios at birth. The review of the literature shows that the number of cases diagnosed during life are increasing. The difference in morbidity and mortality, according to the side involved, is discussed.

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SIXTH INTERNATIONAL CONGRESS ON DISEASES OF THE CHEST.

The Sixth International Congress on Diseases of the Chest will be held at the University of Vienna from August 29 to September 1, 1960.

NASAL NECROSIS ASSOCIATED WITH POSTNASAL PACKING FOR PROTRACTED EPISTAXIS.

JAMES T. KING, M.D.,

Atlanta, Ga.

A white male dental technician, 58 years of age, was seen on July 11, 1959, at 4:30 p.m. at St. Joseph's Infirmary because of severe epistaxis of 18 days' duration. He was referred by a colleague who was leaving on vacation. The patient stated that he had had a similar attack of nosebleed 14 years before, while living in Florida, and had been given up for dead two or three times.

The present illness had begun the day of admission (June 23, 1959), and most of the bleeding was from the right nasal chamber, but the left was thought to have bled also. On that date packing was inserted into both sides of his nose anteriorly which seemed to control the situation fairly well; however, one week later, after the packing was removed and he was thought to be ready for discharge, profuse bleeding ensued. Anterior packs were reinserted, as well as a Fox balloon which was introduced posteriorly. In a few hours bleeding recurred, even more profusely.

Due to the patient's extreme apprehension and pain, he was anesthetized with sodium pentothal administered intravenously, and two postnasal packs were cinched up tightly, one into each choana, which, combined with tight anterior packing, controlled the bleeding. Five days later the posterior packs were removed. The anterior packing was then removed a little at a time over the next four days, when the bleeding recurred, and his nose packed again anteriorly.

The first time I saw the patient he was bleeding freely from the right side around the many cotton pledgets with which his nose was packed. Upon removal of these, the bleeding stopped. The mucous membrane was missing from the posterior inferior portion of the nasal cavity bilaterally, the floor in these areas consisting of bare rough bone—sans periosteum. The approximate necrotic area was 1x2 cms. on either side and corresponded to the horizontal processes of the palatine bones. The posterior septum was freely movable, and the posterior hard palate was rather tender when palpated through the mouth. Biopsy specimens taken from the raw edges of the ulcerated areas showed only necrotic inflamed nasal mucosa. The nose was not repacked.

During this hospitalization the patient was also treated concurrently by an internist, urologist and psychiatrist because of mild hypertension, bladder irritation and toxic delusions. He had been or was being administered the following drugs: Adrestat, aspirin, B & W No. 3 and No. 4, Benadryl, Carbrital, Chloromycetin, Compazine, Darvon, Doriden, morphine, Koagamin, paraldehyde, penicillin, phenobarbital, Premarin, Pyri-

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dium, Rautrax, Sparine, Stelazine, Thorazine, Vesparin, Vistaril, and Fleet's Phosphosoda.* Despite these he continued to bleed intermittently

The episodes of epistaxis, while violent, were of short duration and would not occur more than twice in each 24-hour period; in fact, the bleeding would always seem to stop at the time I reached the patient's bedside, thus preventing my visualizing the precise bleeding point. Daily transfusions were required to keep his hemoglobin at the 9 to 10 gm. level. The necrotic areas began slowly to cover over with granulation tissue, but a purulent rhinitis was present.

On July 17 he was transferred to a more accessible hospital (Georgia Baptist), and most medication was discontinued. With the next bleeding episode, the bleeding point was discovered beneath the right inferior turbinate at the junction of the hard and soft palate just behind the necrotic area. Blood was spurting into and across the nasopharynx giving the illusion that the left side also was bleeding.

The next day, under local anesthesia, the right external carotid artery was ligated. When last seen on August 11th, the patient had had no further show of blood, the necrotic areas were healing, and the purulent rhinitis was improving.

SUMMARY.

Presented is a case report of severe epistaxis of 25 days' duration which was finally controlled by ligation of the homolateral external carotid artery. Necrosis of the nasal mucosa in the posterior floor of the nasal chamber, probably due to tight and prolonged postnasal packing, was a complication.

*"Multi Medici Regem Sustulerunt." Hadrian, 138 AD.
from his nose and to ask for "something to make me rest."

516 Baptist Professional Bldg.

THIRTY-THIRD ANNUAL SPRING CONGRESS OF GILL MEMORIAL EYE, EAR AND THROAT HOSPITAL.

The Gill Memorial Eye, Ear and Throat Hospital announces to the profession its Thirty-third Annual Spring Congress in Ophthalmology and Otolaryngology, April 4 through April 9, 1960. A formidable list of speakers will participate.

For further information write: Superintendent, P. O. Box 1789, Roanoke, Va.

A NEW FOREIGN BODY FORCEPS FOR SPHERICAL OBJECTS IN THE EAR AND NOSE.

MERRILL LINEBACK, M.D.,

College Park, Ga.

The problem of round objects within the recesses of the nose and ear has long vexed otolaryngologists. At best they are removed with difficulty under general anesthesia. Particularly is this true if the foreign bodies are hard without purchase area. Usually a ring curet or cerumen scoop has to be utilized and the object rolled out much as a ball and paddle.

It was with these difficulties in mind that the author designed an "obstetrics"-type forceps (see Fig. 1) with a curved perforated grasping head that allowed the object to fall easily into the two *hands* of the forceps. Corrugation of the purchase lips is added for increased effectiveness.* The width of the distal end in the original forceps is 4 mm., which has proved satisfactory so far, but they are being redesigned to a 3 mm. width which is sufficient for the infant's and young child's canal.

The idea for such forceps came from a chance jesting remark in Surgery, when the author remarked to the nurses that removing a round object from the external canal was much the same procedure as delivering the head in obstetrics. Since June of 1959, I have encountered seven round, hard, spherical foreign bodies; five in the nose, and two in the ear, that have been very satisfactorily removed with the aid of this instrument. One of the main advantages is the absence of bleeding that usually accompanies removal with a ring curet. As an added precaution with posterior foreign bodies near the nasal choanae, the author passes one of his Bardek adenoid fossa balloons into the opposite nasal passageway into the nasopharynx, inflates it, and then allows anesthesia to pro-

*This instrument manufactured by Storz Instrument Co., St. Louis, Mo.

Editor's Note: This manuscript received in The Laryngoscope Office and accepted for publication Jan. 4, 1960.

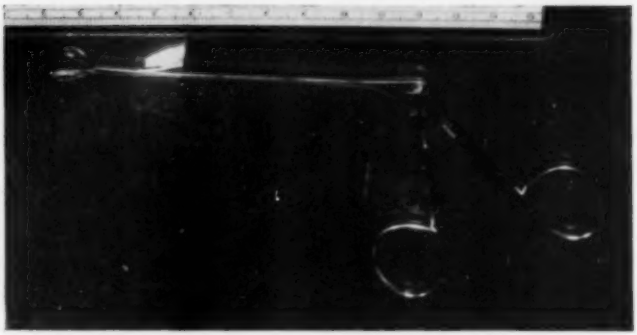

Fig. 1. The "obstetrics"-type forceps showing length and the opening corrugated jaws.

ceed. This added safety factor prevents aspiration of the foreign body into the bronchi as happened once, prior to using the nasal balloon.

SUMMARY.

A new foreign body forceps for use with hard, spherical foreign bodies in the ear canal and nose is presented and discussed. The added advantage of using an adenoid balloon to prevent aspiration of nasal foreign bodies is emphasized. Lack of damage to the meatus of the external auditory canal is an added feature of the new forceps.

124 West Princeton Avenue.

CARDIAC REFLEX UPON LARYNX.

To The Editor:

The nerve of T. Drobnik is known in Europe. It connects the areas of the larynx, especially those of the inferior constrictor, with the heart, lungs, pericardium, and other viscera.[1]

Clinicians should take records of the voice of the patient, and some reflex, in tone, and in expression, will be evident; even some reflex causing shortness of breath, on excretion, as in forced speech.

THOMAS HORACE EVANS, M.D.,

350 South Main St., Freeport, L. I. N. Y.

REFERENCE.

1. EVANS, T. H.: "Pretracheal" Nerve. *Anesthesiology*, 20:2, March-April, 1959.

AMERICAN ASSOCIATION FOR CLEFT PALATE REHABILITATION.

The American Association for Cleft Palate Rehabilitation will hold its Eighteenth Annual Convention at the Brown Palace Hotel, Denver, Colo., Thursday, Friday and Saturday, May 12, 13 and 14, 1960.

This Association is composed of medical, dental and paramedical specialists who are interested in the rehabilitation of persons with cleft lips and palates.

SCIENTIFIC PROGRAM OF THE AMERICAN OTOLOGICAL SOCIETY, INC.

The Deauville Hotel, Miami Beach, Fla., March 13-14, 1960.

Early Embryology of the Auditory Ossicles and Associated Structures in Relation to Certain Anomalies Observed Clinically.

Barry J. Anson, Ph.D. (Med. Sc.);
Jerome S. Hanson, M.S. (by invitation), and
Shatik F. Richany, Ph.D. (by invitation).

Tissue Reaction Following Reconstruction of the Oval Window in Experimental Animals.

Richard J. Bellucci, M.D., and
Dorothy Wolff, Ph.D., (by invitation).

Human Cochlear Responses to Sound Stimuli.

John L. Bordley, M.D.;
Robert J. Ruben, A.B. (by invitation), and
George R. Nager, M.D. (by invitation).

Some Physiological Factors in Inner Ear Deafness.

Merle Lawrence, Ph.D.

Distribution of Hearing Loss in Various Population Centers.

Aram Glorig, M.D.

The Management of Middle Ear Lesions Simulating Otosclerosis.

Francis A. Sooy, M.D. (by invitation).

Experiences with the Stapedectomy Technique of Shea for the Surgical Treatment of Otosclerosis.

David Myers, M.D.;
Woodrow D. Schlosser, M.D. (by invitation), and
Richard A. Winchester, Ph.D. (by invitation).

Vein Plug Stapedoplasty.

Clair M. Kos, M.D.

Partial Stapedectomy.

J. V. Hough, M.D. (by invitation).

Experimental and Clinical Experiences in Oval Window Surgery.

Harold Schuknecht, M.D.

(Open discussion of last four papers.)

Acceleration as a Means of Determining the Sensitivity of the Components of the Non-Auditory Membranous Labyrinth.

Walter H. Johnson, Ph.D (by invitation);
J. Brydon Smith, M.D., and
Joseph A. Sullivan, M.D.

Localization of Monaurally Impaired Listeners.

Richard Viehweg, M.A. (by invitation).

Deafness Due to Mumps; Inner Ear Pathology.

John R. Lindsay, M.D., and
Patricia R. Davey, FRCS (Ed.) (by invitation).

Action of Enzymes on Effusions Obtained from the Middle Ear.

Carl F. Gessert, Ph.D. (by invitation);
Elizabeth S. Baumann (by invitation), and
Ben Senturia, M.D.

Tumors of the Temporal Bone in Their Reciprocal Behavior.

George Kelemen, M.D.

Labyrinthectomy.

Terence Cawthorne, FRCS.

The Lurking Latent Cholesteatoma.

Victor Goodhill, M.D.

PROGRAM FOR THE SCIENTIFIC SESSION OF THE AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY, INC.

Miami Beach, Fla.

March 15, 16, 17, 1960.

"The Influence of Deafness on the Creative Instincts."

Mr. Terence Cawthorne, London, England, *Guest of Honor.*

"Tympanoplasty" (A Panel Discussion).

Moderator: Albert C. Furstenberg, M.D., Ann Arbor, Mich. Participants: Harold F. Schuknecht, M.D., Detroit, Mich.; Joseph Sullivan, M.D., Toronto, Canada; and Nils Richtner, M.D., (By Invitation), Stockholm, Sweden.

Open Discussion.

"Dysmetria in Post-caloric Nystagmus: Its Clinical Significance."

Malcolm H. Stroud, M.D., (By Invitation), St. Louis, Mo., and J. Santiago Riesco, M.D., (By Invitation), Santiago, Chile.

Open Discussion.

"Aural Cholesteatoma: Experimental Observations."

John R. Lindsay, M.D., and Cesar Fernandez, M.D., (By Invitation), Chicago, Ill.

Open Discussion.

"The Value of Laryngograms in the Diagnosis of Laryngeal Lesions."

Joseph H. Ogura, M.D.; Bruce Ellis, M.D.; Sumner Holtz, M.D., (By Invitation); Malcolm McGavran, M.D., and William Powers, M.D., all of St. Louis, Mo.

Open Discussion.

"Tonsillectomy for Acute Peritonsillar Abscess."

Benjamin M. Volk, M.D., and E. C. Brandow, Jr., M.D., (By Invitation), Albany, N. Y.

Open Discussion.

"Method for the Identification and Localization of Cerebrospinal Fluid Rhinorrhea and Otorrhea."

G. O'Neil Proud, M.D., and F. R. Kirchner, M.D., (By Invitation), Kansas City, Mo.

Open Discussion.

"Studies on the Effect of Heparin on Inflammation and Allergy"—Motion picture.

David A. Dolowitz, M.D., Salt Lake City, Utah.

Open Discussion.

"Stapes Surgery—Its Present Status."

Howard P. House, M.D., Los Angeles, Calif.

Open Discussion.

"Isolated Keratosis of the Larynx; Its Relation to Carcinoma."

Malcolm A. McGavran, M.D., (By Invitation), and Walter C. Bauer, M.D., (By Invitation), St. Louis, Mo.

Open Discussion.

"Connective Tissue: A Synthesis of Modern Thought and Its Impact on the Understanding of Nasal Disease"—Candidate's Thesis.

Alex Weisskopf, M.D., San Francisco, Calif.

"The Fractured Mandible—A Method of Treatment for the Otolaryngologist"—Candidate's Thesis.

Walter A. Petryshyn, M.D., Flemington, N. J.

"The Procurement and Processing of Endoscopic Biopsies."

Paul H. Holinger, M.D.; Kenneth C. Johnston, M.D., and Edwin F. Hirsch, M.D., (By Invitation), all of Chicago, Ill.

Open Discussion.

PROGRAM FOR AMERICAN MEDICAL ASSOCIATION SECTION ON LARYNGOLOGY, OTOLOGY AND RHINOLOGY, 109th ANNUAL MEETING.

June 15-17, 1960, Miami Beach, Fla.

Wednesday, June 15, 1960.

Joint Session of the Section on Laryngology, Otology and Rhinology, Section on the Diseases of the Chest, and Section on Radiology.

1. Panel Discussion on Tumors of the Trachea and Bronchi.

   Moderator: Dr. Paul H. Holinger, Chicago 11, Ill.

   Endoscopist: Dr. Herbert W. Schmidt, Rochester, Minn.

   Radiologists: Dr. Barton R. Young, Philadelphia, Pa.; Dr. Wendell G. Scott, St. Louis, Mo.

   Surgeons: Dr. Robert J. Jensik, Chicago 4, Ill.; Dr. Robert W. Jamplis, Palo Alto, Calif.

2. Panel on Disseminated Diseases of the Chest.

   Moderator: Dr. Harold O. Peterson, Minneapolis, Minn.

   Internist: Dr. James A. Wier, Denver, Colo.

   Chest Physician: Dr. David Radner, Chicago, Ill.

   Endoscopist: Dr. Walter H. Maloney, Cleveland 6, O.

   Radiologists: Dr. Eugene F. Van Epps, Iowa City, Ia.; Dr. Clyde A. Stevenson, Spokane, Wash.

   Surgeons: Dr. Donald L. Paulson, Dallas, Tex.; Dr. William Tuttle, Detroit, Mich.

Thursday, June 16, 1960.

Audiology: Its Progress and Problems.

Kenneth O. Johnson, Ph.D., Executive Secretary, American Speech and Hearing Association, Washington 6, D. C., (By Invitation).

External Otitis: Specific Therapy Based on Accurate Diagnosis.

Edley H. Jones, Vicksburg, Miss.

Address of Guest of Honor.

Louis H. Clerf, St. Petersburg 2, Fla.

Nasal Tip Surgery.

Sam H. Sanders, Memphis 4, Tenn.

Address of Section Chairman.

Paul H. Holinger, Chicago 11, Ill.

Problems and Complications in Head and Neck Surgery.

George A. Sisson, Syracuse 10, N.Y., and Norman E. Johnson.

The Long-Term Care of the Laryngectomized Patient.

George F. Reed, Massachusetts Eye and Ear Infirmary, Boston, Mass.

Friday, June 17, 1960.

Cystadenoma of the Parotid and of the Larynx.

Arthur J. Kuhn, Hammond, Ind.

Effect of Premarin on the Ground Substance.

Maurice Schiff, Capt. (MC) USN, U. S. Naval Hospital, Oak Knoll, Calif.

Cervico-Facial Congenital Anomalies.

Richard T. Farrior, Farrior Clinic, Tampa 6, Fla.

Incidence of Hearing Impairment in a Medical Center Population.

Edmund P. Fowler, Jr., M.D., and Thomas H. Fay, Ph.D., New York 32, N. Y.

Otometric Operations.

George D. Albers, Grand Rapids 3, Mich.

Five Year Results of Stapes Mobilization and Current Results with Vein Plug Stapedeoplasty.

C. M. Kos, University Hospitals, Iowa City, Ia.

Fenestration of the Oval Window.

John J. Shea, Jr., Memphis 4, Tenn.

Use of Ear Canal Skin in Myringoplasty.

William F. House, Los Angeles 57, Calif.

Problems with Tympanoplasty.

Edward C. Brandow, Jr., Albany 10, N. Y.

THE MOUNT SINAI HOSPITAL.

An intensive Postgraduate Course in Rhinoplasty, Reconstructive Surgery of the Nasal Septum and Otoplasty will be given July 16, 1960, through July 29, 1960, by Dr. Irving B. Goldman and staff at the Mount Sinai Hospital in affiliation with Columbia University.

Candidates for the course should apply to Registrar for Postgraduate Medical Instruction, The Mount Sinai Hospital, 5th Avenue and 100th Street, New York 29, N. Y.

CASSELBERRY AWARD OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION.

A sufficient fund having accrued from the Casselberry Fund encouraging advancement in the art and science of Laryngology and Rhinology, this sum is now available in part or as a whole, for a prize award. Theses must be in the hands of the Secretary of the American Laryngological Association prior to January 1 of any given year.

The Award is a prize of money with accompanying certificate signed by the officers of the American Laryngological Association. The sum of money will be agreed upon by the Council of the Association after the manuscript has been evaluated by the Award Committee. It may be awarded in whole or in part among several contestants.

Eligible contestants may be: *1.* hospital interns, residents, or graduate students in Rhinology and Laryngology; *2.* an individual with an M.D. degree who is actively practicing or teaching Rhinology and Laryngology in the Americas; *3.* any scientific worker in the field of Rhinology and Laryngology.

Manuscripts shall be presented to the Secretary of the Association, Dr. Lyman G. Richards, 12 Clovelly Road, Wellesley Hills 81, Mass., under nom de plume which shall in no way indicate the author's identity. There shall also be a sealed envelope bearing the nom de plume and containing a card showing the name and address of the contestant which the Secretary shall keep in his possession.

Manuscripts must be limited to 5000 words and must be typewritten in double spacing on one side of the sheet. The thesis shall not have been published elsewhere before submission.

The successful thesis shall become the property of the American Laryngological Association, but this provision shall in no way interfere with publication of the thesis in the Journal of the author's choice. Unsuccessful contributions will be returned promptly to their authors.

The Award which will be made at the Annual Meeting of the American Laryngological Association shall be based on:

1. Originality of material.

2. Scientific and clinical value.

3. Suitability for this Award.

4. Method of presentation as to style, illustrations and reference.

The maximum amount of the Award shall not exceed $200.00.

TEMPLE UNIVERSITY POSTGRADUATE COURSES.

Postgraduate course in laryngology and laryngeal surgery, April 4th to 15th, and September 26th to October 7th, 1960.

Postgraduate course in bronchoesophagology, February 1st to 12th, and November 7th to 18th, 1960.

These courses are to be given in the Department of Laryngology and Bronchoesophagology, Temple University Medical Center, under the direction of Drs. Chevalier L. Jackson and Charles M. Norris.

The tuition fee for each course is $250. Application and information may be obtained by writing to: Jackson-Research, Lab 604, Temple University Medical School, 3400 N. Broad street, Philadelphia 40, Pa.

DIRECTORY OF OTOLARYNGOLOGIC SOCIETIES.

(Secretaries of the various societies are requested to keep this information up to date).

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. Erling W. Hansen, 90 So. Ninth St., Minneapolis, Minn.
Executive Secretary: Dr. William L. Benedict, Mayo Clinic, Rochester, Minn.
Meeting: Palmer House, Chicago, Ill., October, 1960.

AMERICAN ASSOCIATION FOR CLEFT PALATE REHABILITATION.

President: Dr. J. J. Longacre, 1503 Carew Tower, Cincinnati, O.
President-Elect: Dr. D. C. Samuel Pruzansky, D.D.S., 840 So. Wood St., Chicago, Ill.
Secretary-Treasurer: Dr. Spriestersbach, Ph.D., Department of Otolaryngology, University Hospital, Iowa City, Ia.
Meeting: Palace Hotel, Denver, Colo., May 12-14, 1960.

AMERICAN BOARD OF OTOLARYNGOLOGY.

President: Dr. Gordon D. Hoople, 1100 E. Genesee Dr., Syracuse 10, N. Y.
Secretary: Dr. Dean M. Lierle, University Hospital, Iowa City, Ia.
Meeting: Palmer House, Chicago, Ill., October, 1960.

AMERICAN BRONCHO-ESOPHAGOLOGICAL ASSOCIATION.

President: Dr. Verling K. Hart, 107 W. 7th St., Charlotte, N. C.
Vice-President: Dr. Daniel C. Baker, Jr., 903 Park Ave., New York, N. Y.
Secretary: Dr. F. Johnson Putney, 1712 Locust St., Philadelphia 3, Pa.
Treasurer: Dr. Charles M. Norris, 3401 Broad St., Philadelphia, Pa.
Meeting: Deauville Hotel, Miami Beach, Fla., March 15-16, 1960 (Afternoons only).

AMERICAN LARYNGOLOGICAL ASSOCIATION.

President: Dr. W. J. McNally, Montreal, Canada.
Secretary: Dr. Lyman G. Richards, Wellesley Hills, Mass.
Treasurer: Dr. Francis E. LeJeune, New Orleans, La.
Editor, Historian, and Librarian: Dr. Edwin N. Broyles, Baltimore, Md.
Meeting: Deauville Hotel, Miami Beach, Fla., March 18-19, 1960.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY, INC.

President: Dr. Theo. E. Walsh, 640 So. Kingshighway, St. Louis 10, Mo.
President-Elect: Dr. Fletcher D. Woodward, 400 Locust Ave., Charlottesville, Va.
Secretary: Dr. C. Stewart Nash, 700 Medical Arts Bldg., Rochester 7, N. Y.
Treasurer: Dr. K. M. Day, 121 University Pl., Pittsburgh, Pa.
Annual Meeting: Deauville Hotel, Miami Beach, Fla., March 13-19, 1960.

AMERICAN MEDICAL ASSOCIATION, SECTION ON LARYNGOLOGY, OTOLOGY AND RHINOLOGY.

Chairman: Dr. Paul H. Holinger, Chicago, Ill.
Vice-Chairman: Dr. Lawrence R. Boies, Minneapolis, Minn.
Secretary: Dr. Walter E. Heck, San Francisco, Calif.
Representative to Scientific Exhibit: Dr. Walter H. Maloney, Cleveland, Ohio.
Section Delegate: Dr. Gordon F. Harkness, Davenport, Ia.
Alternate Delegate: Dr. Dean M. Lierle, Iowa City, Ia.
Meeting: Miami Beach, Fla., June 13-17, 1960.

AMERICAN OTOLOGICAL SOCIETY, INC.

President: Dr. R. C. Martin, 384 Post St., San Francisco 8, Calif.
Secretary: Dr. Lawrence R. Boies, University Hospitals, Minneapolis 14, Minn.
Meeting: Deauville Hotel, Miami Beach, Fla., March 13-14, 1960.

AMERICAN OTORHINOLOGIC SOCIETY FOR THE ADVANCEMENT OF PLASTIC AND RECONSTRUCTIVE SURGERY.

President: Dr. Joseph Gilbert, 111 E. 61st St., New York, N. Y.
Vice-President: Dr. Kenneth Hinderer, 402 Medical Arts Bldg., Pittsburgh, Pa.
Secretary: Dr. Louis Joel Feit, 66 Park Ave., New York 16, N. Y.
Treasurer: Dr. Arnold L. Caron, 36 Pleasant St., Worcester, Mass.

AMERICAN RHINOLOGIC SOCIETY.

President: Dr. Roland M. Loring, 25 E. Washington St., Chicago, Ill.
Secretary: Dr. Robert M. Hansen, 1735 N. Wheeler Ave., Portland 17, Ore.
Annual Clinical Session: Chicago, Ill. (Definite time and place to be announced later).
Annual Meeting: October 1, 1960, Belmont Hotel, Chicago, Ill.

AMERICAN SOCIETY FOR HEAD AND NECK SURGERY.

President: Dr. John J. Conley, New York, N. Y.
Vice-President: Dr. Joseph H. Ogura, St. Louis, Mo.
Treasurer: Dr. F. Johnson Putney, Philadelphia, Pa.
Secretary: Dr. George A. Sisson, Syracuse, N. Y.
Annual Meeting: Palmer House, Chicago, Ill., October 1, 1960.

AMERICAN SOCIETY OF FACIAL PLASTIC SURGERY.

President: Dr. Oscar J. Becker, Chicago, Ill.
Vice-President: Dr. Sam H. Sanders, Memphis, Tenn.
Treasurer: Dr. Joseph C. Miceli, Brooklyn, N. Y.
Secretary: Dr. Samuel M. Bloom, 123 E. 83rd St., New York 28, N. Y.
Meeting: Chicago, Ill., October, 1960.

AMERICAN SOCIETY OF OPHTHALMOLOGIC AND OTOLARYNGOLOGIC ALLERGY.

President: Dr. Walter E. Owen, Peoria, Ill.
President-Elect: Dr. Leland H. Prewitt, Ottumwa, Ia.
Vice-President: Dr. D. A. Skinner, Newark, O.
Secretary-Treasurer: Dr. Daniel S. DeStio, 121 S. Highland Ave., Pittsburgh 6, Pa.
Annual Meeting: Palmer House, Chicago, Ill., October 8, 1960.

ASSOCIACAO MEDICA DO INSTITUTO PENIDO BURNIER—CAMPINAS.

President: Dr. Alberto Gallo.
First Secretary: Dr. Alfredo Martinelli.
Second Secretary: Dr. Guedes de Melo Neto.
Librarian-Treasurer: Dr. L. de Souza Queiroz.
Editors for the Archives of the Society: Dr. Antonio de Almeida, Dr. Gabriel Pôrto, and Dr. Roberto Franco do Amaral.

ASOCIACION DE OTORRINOLARINGOLOGIA Y BRONCOESOFAGOLOGIA DE GUATEMALA.

Presidente: Dr. Julio Quevedo, 15 Calle Oriente No. 5.
First Vice-Presidente: Dr. Héctor Cruz, 3a Avenida Sur No. 72.
Second Vice-Presidente: Dr. José Luis Escamilla, 5a Calle Poniente No. 48.
Secretario-Tesorero: Dr. Horace Polanco, 13 Calle Poniente No. 9-D.

ASOCIACION DE OTO-RINO-LARINGOLOGIA DE BARCELONA, SPAIN.

Presidente: Dr. J. Abello.
Vice-Presidente: Dr. Luis Suñe Medan.
Secretario: Dr. Jorge Perellò, 319 Provenza, Barcelona.
Vice-Secretario: Dr. A. Pinart.
Vocal: Dr. J. M. Ferrando.

BALTIMORE NOSE AND THROAT SOCIETY.

Chairman: Dr. Walter E. Loch, 1039 No. Calvert St., Baltimore, Md.
Secretary-Treasurer: Dr. Theodore A. Schwartz.

BUENOS AIRES CLUB OTOLARINGOLOGICO.

Presidente: Dr. K. Segre.
Vice-Presidente: Dr. A. P. Belou.
Secretario: Dr. S. A. Aranz.
Pro-Secretario: Dr. J. M. Tato.
Tesorero: Dr. F. Games.
Pro-Tesorero: Dr. J. A. Bello.

CANADIAN OTOLARYNGOLOGICAL SOCIETY SOCIETE CANADIENNE D'OTOLARYNGOLOGIE.

President: Dr. Gordon H. Francis, 925 W. Georgia St., Vancouver, B. C.
Secretary: Dr. Donald M. MacRae, 324 Spring Garden Road, Halifax, Nova Scotia.
Meeting: Jasper Park Lodge, Jasper National Park, Alberta, June 10-12, 1960.

CENTRAL ILLINOIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. William F. Hubble, Decatur, Ill.
President-Elect: Dr. Charles D. Sneller, Peoria, Ill.
Vice-President: Dr. Edgar T. Blair, Springfield, Ill.
Delegate at Large: Dr. G. Leroy Porter, Urbana, Ill.
Secretary-Treasurer: Dr. Clarence A. Fleischli, Springfield, Ill.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

President: Dr. George Woodruff, Woodruff Clinic, Joliet, Ill.
Vice-President: Dr. Linden Wallner, 122 So. Michigan, Chicago, Ill.
Secretary-Treasurer: Dr. Robert Lewy, 25 East Washington St., Chicago 2, Ill.
Meeting: First Monday of each month, October through May.

CHILEAN SOCIETY OF OTOLARYNGOLOGY.

President: Dr. Enrique Grünwald S.
Vice-President: Dr. Agustin Estartus.
Secretary: Dr. Marcos Chaimovich S.
Treasurer: Dr. Benjamin Kapkan K.
Director: Dr. Alberto Basterrica A.

COLORADO OTOLARYNGOLOGY SOCIETY.

President: Dr. James T. Blair, Denver, Colo.
Vice-President: Dr. James Rigg, Grand Junction, Colo.
Secretary: Dr. Will P. Pirkey, Denver, Colo.

COLUMBUS, OHIO, OPHTHALMOLOGICAL AND OTOLARYNGOLOGICAL SOCIETY.

President: Dr. John E. Arthur.
Secretary: Dr. M. L. Battles.
Meetings: First Monday of October through May, University Club, Columbus, O.

DALLAS ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. Edward A. Newell.
Vice-President: Dr. Thomas M. McCrory.
Secretary-Treasurer: Dr. James L. Baldwin, 1627 Medical Arts Bldg., Dallas, Tex.

FEDERACION ARGENTINA, DE SOCIEDADES DE OTORRINOLARINGOLOGIA.

Secretary of the Interior: Prof. Dr. Atilio Viale del Carril.
Secretary of the Exterior: Dr. Aldo G. Remorino.
Secretary Treasury: Prof. Dr. Antonio Carrascosa.
Pro-Secretary of the Interior: Prof. Dr. Carlos P. Mercandino.
Pro-Secretary of the Exterior: Prof. Dr. James A. del Sel.
Pro-Secretary of the Treasury: Dr. Jorge Zubizarreta.

FIRST CENTRAL AMERICAN CONGRESS OF OTORHINOLARYNGOLOGY.

President: Dr. Victor M. Noubleau, San Salvador.
Secretary-Treasurer: Dr. Hector R. Silva, Calle Arce No. 84, San Salvador, El Salvador, Central America.

FLORIDA SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. G. Dekle Taylor, Jacksonville, Fla.
President-Elect: Dr. Kenneth S. Whitmer, Miami, Fla.
First Vice-President: Dr. William H. Anderson, Jr., Ocala, Fla.
Second Vice-President: Dr. Marion W. Hester, Lakeland, Fla.
Secretary-Treasurer: Dr. Joseph W. Taylor, Jr., 1 Davis Blvd., Tampa 6, Fla.

FOURTH LATIN-AMERICAN CONGRESS OF OTORINOLARINGOLOGIA.

President: Dr. Dario.
Secretary:
Meeting:

FORT WORTH EYE, EAR, NOSE AND THROAT SOCIETY.

President: Dr. Van D. Rathgeber.
Vice-President: Dr. William Skokan.
Secretary-Treasurer: Dr. Paul Rockwell.

GREATER MIAMI EYE, EAR, NOSE AND THROAT SOCIETY.

President: Dr. Mariano C. Caballero.
Vice-President: Dr. Joseph Freeman.
Secretary-Treasurer: Dr. H. Carlton Howard.
Meeting: Quarterly in March, May, October and December on the second Thursday of the month, 6:30 P.M., at the McAllister Hotel, Miami, Fla.

INTERNATIONAL BRONCHOESOPHAGOLOGICAL SOCIETY.

President: Dr. Jo Ono, Tokyo, Japan.
Secretary: Dr. Chevalier L. Jackson, 3401 N. Broad St., Philadelphia 40, Pa., U. S. A.
Meeting:

KANSAS CITY SOCIETY OF OTOLARYNGOLOGY AND OPHTHALMOLOGY.

President: Dr. Clarence H. Steele.
President-Elect: Dr. Dick H. Underwood.
Secretary: Dr. James T. Robison, 4620 J. C. Nichols Parkway, Kansas City, Mo.
Meeting: Third Thursday of November, January, February and April.

LOS ANGELES SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. Max E. Pohlman.
Secretary-Treasurer: Dr. Wendell C. Irvine.
Chairman of Ophthalmology Section: Dr. Carroll A. McCoy.
Secretary of Ophthalmology Section: Dr. Philip D. Shanedling.
Chairman of Otolaryngology Section: Dr. Robert W. Godwin.
Secretary of Otolaryngology Section: Dr. Francis O'N. Morris.
Place: Los Angeles County Medical Association Bldg., 1925 Wilshire Blvd., Los Angeles, Calif.
Time: 6:30 P.M. last Monday of each month from September to June, inclusive—Otolaryngology Section. 6:30, first Thursday of each month from September to June, inclusive—Ophthalmology Section.

LOUISIANA-MISSISSIPPI OPHTHALMOLOGICAL AND OTOLARYNGOLOGICAL SOCIETY.

President: Dr. Lucian W. Alexander, 921 Canal St., New Orleans, La.
Secretary: Dr. Edley H. Jones, 1301 Washington St., Vicksburg, Miss.
Meeting: Edgewater Gulf Hotel, Edgewater Park, Miss., April 8-9, 1960.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

Chairman: Members serve as chairman in alphabetical order monthly.
Secretary-Treasurer: Dr. Roland H. Myers, 1720 Exchange Bldg., Memphis, Tenn.
Assistant Secretary-Treasurer: Dr. William F. Murrah, Jr., Exchange Bldg., Memphis, Tenn.
Meeting: Second Tuesday in each month at 8:00 P.M. at Memphis Eye, Nose and Throat Hospital.

MEXICAN ASSOCIATION OF PLASTIC SURGEONS.

President: Dr. Cesar LaBoide, Mexico, D. F.
Vice-President: Dr. M. Gonzales Ulloa, Mexico, D. F.
Secretary: Dr. Juan De Dios Peza, Mexico, D. F.

MEXICAN SOCIETY OF OTOLARYNGOLOGY.

President: Dr. Rafael Giorgana.
Secretary: Dr. Carlos Valenzuela, Petrarca 332-1, Mexico 5, D. F.

MISSISSIPPI VALLEY MEDICAL SOCIETY.

President: Dr. Arthur S. Bristow, Princeton, Mo.
Secretary-Treasurer: Dr. Harold Swanberg, Quincy, Ill.
Assistant Secretary-Treasurer: Dr. Jacob E. Reisch, Springfield, Ill.

NETHERLANDS SOCIETY OF OTO-RHINO-LARYNGOLOGY.
(Nederlandsche Keel-Neus-Oorheelkundige Vereeniging.)

President: Dr. H. Navis, Sonsbeekweg 6, Arnhem.
Secretary: Dr. W. H. Struben, J. J. Viottastraat 1, Amsterdam.
Treasurer: Mrs. F. Velleman-Pinto, Jac. Ohrechtstr. 66, Amsterdam.

NORTH CAROLINA EYE, EAR, NOSE AND THROAT SOCIETY.

President: Dr. J. C. Peele, Kinston Clinic, Kinston, N. C.
Vice-President: Dr. George E. Bradord, Winston-Salem, N. C.
Secretary-Treasurer: Dr. J. D. Stratton, 1012 Kings Drive, Charlotte 7, N. C.
Meeting:

NORTH OF ENGLAND OTOLARYNGOLOGICAL SOCIETY.

President: Mr. G. L. Thompson, 16 Ramshill Road, Scarborough, Yorkshire.
Vice-President: Mr. J. H. Otty, Frizley Old Hall, Frizinghall Road, Bradford, Yorkshire.
Secretary and Treasurer: Mr. R. Thomas, 27 High Petergate, York, Yorkshire.

OREGON ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. David D. DeWeese, 1216 S. W. Yamhill St., Portland 5, Ore.
Secretary-Treasurer: Dr. Paul B. Myers, 223 Medical Dental Bldg., Portland 5, Ore.
Meeting: Fourth Tuesday of each month from September through May, Henry Thiele Restaurant, 23rd and W. Burnside, Portland, Ore.

OTOSCLEROSIS STUDY GROUP.

President: Dr. E. H. Campbell, 133 So. 36th St., Philadelphia 4, Pa.
Secretary-Treasurer: Dr. Raymond Jordan, 121 University Place, Pittsburgh, Pa.
Meeting: Palmer House, Chicago, Ill., October, 1960.

PACIFIC COAST OTO-OPHTHALMOLOGICAL SOCIETY.

President: Dr. John F. Tolan, 1118-9th Ave., Seattle 5, Wash.
Secretary-Treasurer: Dr. Homer E. Smith, 686 Twelfth Ave., Salt Lake City, Utah.
Meeting:

PAN AMERICAN ASSOCIATION OF OTO-RHINO-LARYNGOLOGY AND BRONCHO-ESOPHAGOLOGY.

President: Dr. Paul Holinger, 700 No. Michigan Blvd., Chicago, Ill.
Executive Secretary: Dr. Chevalier L. Jackson, 3401 No. Broad St., Philadelphia 40, Pa., U. S. A.
Meeting: Seventh Pan American Congress of Oto-Rhino-Laryngology and Broncho-Esophagology.
Time and Place: Miami, Fla., March, 1960.

PHILADELPHIA LARYNGOLOGICAL SOCIETY.

President: Dr. John J. O'Keefe.
Vice-President: Dr. Joseph P. Atkins.
Secretary: Dr. William A. Lell.
Executive Committee: Dr. Harry P. Schenck, Dr. Benjamin H. Shuster, Dr. William A. Lell, Dr. William J. Hitschler, and Dr. Chevalier L. Jackson.

PHILIPPINE SOCIETY OF OTOLARYNGOLOGY AND BRONCHO-ESOPHAGOLOGY.

President: Dr. Macario G. Tan, 426 Evangelista, Manila, P. I.
Vice-President: Dr. Ariston G. Bautista, 460 Isaac Peral, Manila, P. I.
Secretary-Treasurer: Dr. Angel Enriquez, American Hospital, Aduana St., Manila, P. I.

PITTSBURGH OTOLOGICAL SOCIETY.

President: Dr. Emory A. Rittenhouse, 203 Masonic Bldg., McKeesport, Pa.
Vice-President: Dr. Carson S. Demling, 513 Jenkins Bldg., Pittsburgh 22, Pa.
Secretary-Treasurer: Dr. Clyde B. Lamp, 8101 Jenkins Arcade, Pittsburgh 22, Pa.

PORTUGUESE OTORHINOLARYNGOLOGICAL SOCIETY.

President: Dr. Albert Luis de Mendonca.
Secretary: Dr. Antonio da Costa Quinta, Avenida, de Liberdale 65, 1° Lisbon.

PUGET SOUND ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. Clifton E. Benson, Bremerton, Wash.
President-Elect: Dr. Carl D. F. Jensen, Seattle, Wash.
Secretary: Dr. Willard F. Goff, 1215 Fourth Ave., Seattle, Wash.

SIXTH INTERNATIONAL CONGRESS ON DISEASES OF THE CHEST.

Meeting: University of Vienna, August 29 to September 1, 1960.

RESEARCH STUDY CLUB OF LOS ANGELES, INC.

Chairman: Dr. Orrie E. Ghrist, 210 N. Central Ave., Glendale, Calif.
Treasurer: Dr. Norman Jesberg, 500 So. Lucas Ave., Los Angeles 17, Calif.
Otolaryngology: Dr. Russell M. Decker, 65 N. Madison Ave., Pasadena 1, Calif.
Ophthalmology: Dr. Warren A. Wilson, 1930 Wilshire Blvd., Los Angeles 57, Calif.
Mid-Winter Clinical Convention annually, the last two weeks in January at Los Angeles, Calif.

SECTION ON OTOLARYNGOLOGY OF THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA.

Chairman: Dr. Morris E. Krucoff.
Vice-Chairman: Dr. Max J. Fischer.
Secretary: Dr. Adrian J. Delaney.
Treasurer: Dr. Robert D. Ralph.
Meetings are held the second Tuesday of September, November, January, March and May, at 6:30 P.M.
Place: Army and Navy Club, Washington, D. C.

SCOTTISH OTOLARYNGOLOGICAL SOCIETY.

President: Dr. F. T. Land, 13 Newton Place, Glasgow, C. 3.
Secretary-Treasurer: Dr. J. F. Birrell, 14 Moray Place, Edinburgh.
Assistant Secretary: Dr. H. D. Brown Kelly, 11 Sandyford Place, Glasgow, C. 3.

SOCIEDAD COLUMBIANA DE OFTALMOLOGIA Y OTORRINOLARINGOLOGIA (BOGOTA, COLUMBIA).

Presidente: Dr. Alfonso Tribin P.
Secretario: Dr. Felix E. Lozano.
Tesorero: Dr. Mario Arenas A.

SOCIEDAD CUBANA DE OTO-LARINGOLOGIA.

President: Dr. Reinaldo de Villiers.
Vice-President: Dr. Jorge de Cárdenas.
Secretary: Dr. Pablo Hernandez.

SOCIEDAD DE ESTUDIOS CLINICOS DE LA HABANA.

Presidente: Dr. Frank Canosa Lorenzo.
Vice-Presidente: Dr. Julio Sanguily.
Secretario: Dr. Juan Portuondo de Castro.
Tesorero: Dr. Luis Ortega Verdes.

SOCIEDAD DE OTORRINOLARINGOLOGIA Y BRONCOESOFAGOSCOPIA DE CORDOBA.

Presidente: Dr. Aldo Remorino.
Vice-Presidente: Dr. Luis E. Olsen.
Secretario: Dr. Eugenio Romero Diaz.
Tesorero: Dr. Juan Manuel Pradales.
Vocales: Dr. Osvaldo Suárez, Dr. Nondier Asis R., Dr. Jorge Bergallo Yofre.

SOCIEDAD DE OTO-RINO-LARINGOLOGIA, COLEGIO MEDIO DE EL SALVADOR, SAN SALVADOR, C. A.

President: Dr. Salvador Mixco Pinto.
Secretary: Dr. Daniel Alfredo Alfaro.
Treasurer: Dr. Antonio Pineda M.

SOCIEDAD ESPANOLA DE OTORRINOLARINGOLOGIA.

Presidente: Dr. D. Adolfo Hinojar Pons.
Vice-Presidente: Dr. D. Jose Perez Mateos.
Secretario General: Dr. D. Francisco Marañés.
Tesorero: Dr. D. Ernesto Alonso Ferrer.

SOCIEDAD MEXICANA DE OTORRINOLARINGOLOGIA
Monterrey 47-201
Mexico 7, D. F.

President: Dr. Rafael Giorgana.
Secretary: Dr. Carlos Valenzuela.
Treasurer: Dr. Benito Madariaga.
First Vocal: Dr. Rafael González.
Second Vocal: Dr. Juan Oberhauser.

SOCIEDAD NACIONAL DE CIRUGIA OF CUBA.

Presidente: Dr. Reinaldo de Villers.
Vice-Presidente: Dr. César Cabrera Calderin.
Secretario: Dr. José Xirau.
Tesorero: Dr. Alfredo M. Petit.
Vocal: Dr. José Gross.
Vocal: Dr. Pedro Hernández Gonzalo.

SOCIEDAD OTO-RINO-LARINGOLOGIA DE LOS HOSPITALES DE MADRID.

Presidente: Dr. Don Fernando Beltrán Castillo.
Secretario General: Dr. Don Alfonso Vassallo de Mumbert.
Tesorero: Dr. Don Rafael Garcia Tapia.

SOCIEDAD DE OTORRINOLARINGOLOGIA Y BRONCOESOFAGOLOGIA DEL NORESTE.

Presidente: Dr. Livio M. Lataza C.
Secretario: Dr. Ramón Prieto.
Tesorero: Dr. José Gomez Galizia.
Vocales: Dres. Enrique del Buono y O. Benjamin Serrano.

SOCIEDAD VENEZOLANA DE OTORRINOLARINGOLOGIA.

Presidente: Dr. Gabriel Briceño Romero.
Vice-Presidente: Dr. Silvestre Rincón Fuenmayor.
Secretario General: Dr. Oscar Bustamante Miranda.
Tesorero: Dr. Arturo Marrero Gómez.
Vocales: Dr. Miguel Octavio Russa, Dr. Benjamin Briceño, Dr. Oscar Gonzalez Castillo.

SOCIEDADE DE OFTALMOLOGIA E OTORRINOLARINGOLOGIA DO RIO GRANDE DO SUL.

President: Dr. Ivo Adolpho Kuhl.
Secretary: Dr. Decio Lisboa Castro.
Treasurer: Dr. Jorge Valentin.

SOCIEDAD PANAMENA DE OTORRINOLARINGOLOGIA.

Presidente: Dr. Manuel Preciado.
First Vice-Presidente: Dr. Alonso Roy.
Second Vice-Presidente: Dr. Carlos Arango Carbone.
Secretario: Dr. Maria Esther Villalaz.
Tesorero: Dr. Ramòn Crespo.

SOCIEDADE PORTUGUESA DE OTORRINOLARINGOLOGIA E DE BRONCO-ESOFAGOLOGIA.

Presidente: Dr. Alberto Luis De Mendonca.
Vice-Presidente: Dr. Jaime de Magalhaes.
1.° Secretario: Dr. Antonio da Costa Quinta.
2.° Secretario: Dr. Albano Coelho.
Tesoureiro: Dr. Jose Antonio de Campos Henriques.
Vogais: Dr. Teofilo Esquivel.
Dr. Antonio Cancela de Amorim.
Sede: Avenida da Liberdade, 65, 1°, Lisboa.

SOCIETY OF MILITARY OTOLARYNGOLOGISTS.

President: Lt. Col. Stanley H. Bear, USAF (MC), USAF Hospital, Maxwell (Air University), Maxwell Air Force Base, Ala.
Secretary-Treasurer: Capt. Maurice Schiff, MC, USN, U. S. Naval Hospital, Oakland, Calif.
Meeting:

SOUTH CAROLINA SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. F. R. Price, 118 Rutledge Ave., Charleston, S. C.
President-Elect: Dr. L. D. Lide, 161 W. Cheves St., Florence, S. C.
Vice-President: Dr. R. E. Livingstone, 1505 Main St., Newberry, S. C.
Secretary-Treasurer: Dr. Roderick Macdonald, 330 E. Main St., Rock Hill, S. C.

SOUTHERN MEDICAL ASSOCIATION, SECTION ON OPHTHALMOLOGY AND OTOLARYNGOLOGY.

Chairman: Dr. George M. Haik, Professor and Head of the Department of Ophthalmology at Louisiana State University School of Medicine, 812 Maison Blanche Building, New Orleans 16, La.

Chairman-Elect: Dr. Mercer G. Lynch, Assistant Professor of Otolaryngology, Tulane University School of Medicine, 3503 Prytania St., New Orleans 15, La.

Vice-Chairman: Dr. Bernard J. McMahon, Director of the Department and Clinical Professor of Otolaryngology, St. Louis University School of Medicine, 8230 Forsythe Blvd., Clayton 24, Mo.

Secretary: Dr. Albert C. Esposito, First Huntington National Bank Building, Huntington, W. Va. Formerly instructor of Ophthalmology, Ohio State University College of Medicine, Columbus, O.

Meeting: St. Louis, Mo., October 31, 1960, to November 3, 1960.

VIRGINIA SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. Benjamin Sheppard, 301 Medical Arts Building, Richmond, Va.

President-Elect: Dr. Emanuel U. Wallerstein, Professional Building, Richmond, Va.

Vice-President: Dr. Calvin T. Burton, Medical Arts Building, Roanoke, Va.

Secretary-Treasurer: Dr. Maynard P. Smith, 600 Professional Building, Richmond, Va.

WEST VIRGINIA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

President: Dr. Nime K. Joseph, Wheeling, W. Va.

President-Elect: Dr. John A. B. Holt, Charleston, W. Va.

Vice-President: Dr. William K. Marple, Huntington, W. Va.

Secretary-Treasurer: Dr. Albert C. Esposito, Huntington, W. Va.

Director for Two Years: Dr. James T. Spencer, Charleston, W. Va.